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SCHOOL LUNCH CONSUMPTION IN TERMS OF SERVING METHOD

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Education

in

The Interdepartmental Program in Education

by
Faye Blanchard Robichaux
B.S., University of Southwestern Louisiana, 1965
M.B.A., Nicholls State University, 1977
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ABSTRACT

The purpose of this study was to determine the effects of the "offer versus serve" method on school lunch consumption by students in grades 1-3 when nutrition-related achievement of students was similar. This method allows students to decline two of the five food items. The sample included students in grades 1-3 in two public schools in neighboring parishes, Lafourche and Assumption. The Lafourche Parish school was using the "offer versus serve" method, while the Assumption Parish school was using the traditional method of serving lunch. Nutrition achievement of students in both schools was determined; the mean scores of students in the two schools compared favorably.

Food consumption data were collected from the students in grades 1-3 at one school using the traditional method of serving and from students in grades 1-3 at another school using the "offer versus serve" method. Comparable menus, days of the week, procedures, and food consumption raters were used.

An analyses of the data revealed that there was no significant difference at the .05 level of confidence in the consumption of the meat, salad, dessert, and milk items between methods of serving. There was a significant difference in the consumption of vegetables, fruit, and

bread at the .01 level of confidence and the combination dish at the .05 level of confidence. In three of the instances in which the null hypotheses were rejected, consumption of vegetables, bread, and the combination dish was greater when the "offer versus serve" method was used.

The study indicated that food consumption was not adversely affected when "offer versus serve" was implemented, thus supporting the theory that neither method of serving was superior to the other in terms of food consumption. Therefore, it is recommended that the "offer versus serve" method be implemented with a nutrition education program involving students, parents, teachers, and food service personnel.

CHAPTER ONE

Introduction and Methodology

Alternate lunch patterns have been introduced to school lunchrooms throughout the nation. Some of these changes were legislated, while others have been made by choice.

"Offer versus serve" is a serving method mandated by Congress in 1975, requiring school cafeterias to offer senior high school students a choice of declining one or two food items (Public Law 94-105, 1975). Research has shown that the menu options help to maintain food costs and minimize waste (U. S. General Accounting office, 1981). In 1977, an amendment to the National School Lunch Act extended "offer versus serve" to students in junior high and middle schools with approval of the local school food authority (Public Law 95-166, 1977). With the federal budget cuts of the Reagan administration in 1981 also came the Omnibus Budget Reconciliation Act which extended the "offer versus serve" provision to students at all grade levels including preschool (U. S. Statutes at Large, 1981). The local school food service supervisor has the option to implement "offer versus serve" at all levels except the senior-high level where it is mandatory.

Implementation of the "offer versus serve" method is determined by the number of food items of the offered lunch a student is required to take. In schools not implementing "offer versus serve," a student must take the entire five-food item lunch in the full portions offered. In schools implementing "offer versus serve," a student may decline or take a smaller portion of one or two food items. This choice depends on the grade level and the manner in which the school food authority chooses to implement the program in grades below the senior-high level.

Research involving high school students (Jansen and Harper, 1980) indicated that free-choice lunch meal patterns combined with nutrition education resulted in decreased plate waste without measurable reductions in the nutritional quality of the lunches. These authors believe research is needed in the lower grades since the full five-item school lunch has considerable merit as an educational tool (Jansen, et al., 1980). Controversy exists as to whether or not the "offer versus serve" method is appropriate for children in the lower elementary grades.

Objectives of the Study

The purpose of the study was to determine the effects of the "offer versus serve" method on the consumption of the school lunch by students in grades 1-3 when nutrition-related achievement was similar.

The following null hypotheses were tested in analyzing the data:

1. There is no significant difference in the consumption of meats or meat alternates when the "offer versus serve" method is implemented.

2. There is no significant difference in the consumption of combination dishes when the "offer versus serve" method is implemented.

3. There is no significant difference in the consumption of vegetables when the "offer versus serve" method is implemented.

4. There is no significant difference in the consumption of fruits when the "offer versus serve" method is implemented.

5. There is no significant difference in the consumption of salads when the "offer versus serve" method is implemented.

6. There is no significant difference in the consumption of breads when the "offer versus serve" method is implemented.

7. There is no significant difference in the consumption of dessert when the "offer versus serve" method is implemented.

8. There is no significant difference in the consumption of milk when the "offer versus serve" method is implemented.

Delimitations

A school in Lafourche Parish and one in Assumption Parish, recommended by the parish school food service supervisors, were used to represent each of the serving methods. The schools had: (1) similar enrollments, (2) comparable participation in the lunch program, (3) comparable proportions of free and reduced-price lunches, (4) similar locations, (5) comparable nutrition education programs, (6) comparable enrollments in grades 1-3, and (7) comparable sex distribution in grades 1-3.

Significance of the Problem

The problem identified in this study is important because food prices have increased, and the federal government has cut subsidies. As a result, school food service personnel must utilize resources more carefully. In an attempt to reduce cost and food waste, the "offer versus serve method" was mandated for all high schools by Congress in 1975 and became a local option for all other grades in August of 1981 (Public Law 94-105, 1975).

The majority of school food service personnel, principals, and teachers has supported the "offer versus serve" program in the upper grades because of favorable publicity and the belief that children at that age have definite set patterns of consumption (Smith and Justice,

1979; St. Pierre and Rezmovic, 1982; Jansen and Harper, 1978; Lachance, 1976).

Implementation of the "optional" menu plan for younger children has created controversy resulting in two opposing views. Opponents advocate that "offer versus serve" deprives young children of being introduced to a variety of foods (Mattern, 1982). Proponents advocate that "offer versus serve" has no effect on consumption and is more economical (Smith and Justice, 1979; St. Pierre and Rezmovic, 1982; Jansen and Harper, 1978; Lachance, 1976.)

However, research studies indicate that placing food on a plate was not enough to motivate a child to eat it (Bush, 1981). Lachance (1976) concluded that the serving line was not the place to change the eating habits of the children. Dunn (1981) pointed out that there were more economical methods of introducing children to new foods. One method which was used successfully was tasting parties (Nutrition Education Is As Easy As 1, 2 . . . . 9, 1976).

State Department of Education personnel in the Nutrition Section, Bureau of Food and Nutrition Services (Mandell, 1983) expressed concern for both the economical and educational aspects of the "offer versus serve" method. They believe that since there had been no research completed on consumption differences with "offer versus serve" implemented and "offer versus serve" not implemented in grades 1-3, the information would be invaluable in

implementing "offer versus serve" if the null hypotheses were accepted.

Definition of Terms

Definition of terms to be used in this study include the following:

Plate Waste--food served as part of the school lunch but not eaten.

Type A Lunch--menu pattern which requires five food items--meat or meat alternate, two servings of vegetables and/or fruit, bread or bread alternate, and milk (U. S. Department of Agriculture, 1977).

Traditional Lunch Pattern--Type A lunch.

Offer versus Serve--serving method which allows students to decline two of the five food items (State of Louisiana, Department of Education, 1976).

Optional Menu Plan--another term for "offer versus serve."

Menu Item--any planned main dish, vegetable or fruit, bread, milk, and other foods that are named on the menu to be served on a particular day (State of Louisiana, Department of Education, 1976).

Food Item--one of the five required foods within the four components of the school lunch pattern (State of Louisiana, Department of Education, 1976).

Combination Dish--menu item composed of two food items.

Recommended Daily Dietary Allowances (RDAs)--amounts of essential nutrients considered, on the basis of available scientific knowledge, adequate to meet the known nutritional needs of practically all healthy persons in the nation. RDAs were developed by the National Research Council, National Academy of Sciences (U. S. General Accounting Office, 1981).

Visual Estimation Method--a method of measuring food consumption requiring observers to rate individual menu items on each child's plate at the end of a meal by estimating the amount left of the full portion.

Type of Research

This research was a comparative study of food consumption using two different serving methods. The sample included students in grades 1-3 in two public schools in neighboring parishes. The school located in Lafourche Parish was using the "offer versus serve" method (experimental group) and the school located in Assumption Parish was using the traditional method of serving lunch (control group).

Description of Instruments

The Nutrition Achievement Tests from the National Dairy Council (Dairy and Food Nutrition Council, 1982-1983) were used as a foundation to develop the Nutrition Achievement Test 1 (Appendix F) designed for students in grades one and two and the Nutrition Achievement Test 2 (Appendix G) for third graders. These tests were designed by the researcher and three teachers from grades 1-3 to establish the nutrition education level of the students in these grades. A panel of nine teachers (three from each grade level) then reviewed the tests for content validity.

Reliability of the two nutrition tests was established by administering the instrument to 250 students in grades 1-3 at a school not associated with the study. There were approximately 85 students per grade level. The split-half method, utilizing odd and even scores in conjunction with

the Spearman-Brown prophecy formula, was used to determine the reliability coefficients. Nutrition Achievement Test 1 and Nutrition Achievement Test 2 had a reliability coefficient of .71 and .74 respectively.

A consumption rating instrument (Appendix I) was also developed and pilot tested. The rating scale contained eight menu items: meat, combination dish, vegetable, fruit, salad, bread, milk, and dessert which could be ranked into one of seven categories: ate none (0), tasted (1 teaspoon but less than 1/3), ate about 1/3 (1/3 but less than 1/2), ate about 1/2 (1/2 but less than 2/3), ate about 2/3 (2/3 but not less than 1 teaspoon remaining), almost all (1 teaspoon remaining), all (100%).

Selection of Sample

Two schools were selected based on similarities in the following areas: location, enrollment, participation in the lunch program, proportion of free and reduced-price lunches, sex distribution, and nutrition education level.

The school using the "offer versus serve" method was located in Lafourche Parish, and the school using the traditional method was in Assumption Parish.

A nutrition achievement test was administered to all students in grades 1-3 in both schools. Test results revealed that the mean scores were similar at each grade level of the two schools.

Table 1 shows the distribution of students by grade level and serving method. A total of 925 students comprised the sample.

Table 1

Distribution of Students in Sample by Grade Level and Serving Method

Grade	"Offer vs Serve"	Traditional
1	188	196
2	142	119
3	138	142
Total	468	457

Table 2 reveals the mean score on the Nutrition Achievement Test by grade level and serving method. The highest possible score on the nutrition achievement test for first and second graders was 35. A perfect score on the test for third graders was 30.

Table 2

Mean Test Scores on Nutrition Achievement Test
by Grade Level and Serving Method

Grade	"Offer vs Serve"	Traditional
1	19.31	17.74
2	21.15	22.66
3	19.41	14.46

Procedures

The visual estimation method, the reliability of which has been documented (Lachance, 1976; Acredolo and Pick, 1975; St. Pierre and Glotzer, 1981), was selected for use in this study.

Prior to the study, a training session for the food consumption raters (see Appendix J for a list of raters) was held. The training was conducted by the researcher with the assistance of a Lafourche Parish School cafeteria manager who displayed whole portions of each menu item. The researcher weighed portions of each menu item in amounts designated on the food consumption rating scale (Appendix I) and displayed these next to the whole portions. The trainees were given an opportunity to visually study the portions of each food item. Thirty trays were used in the practice set for trainees. Raters then compared results and discussed discrepancies.

To establish inter-rater reliability, trainees scored 30 trays as they were returned by students during the lunch period. The same 30 trays were rated by all trainees. The scores from each rater were then correlated with the researcher's set of scores. All correlation coefficients were .95 or above.

Two weeks prior to the study at each school an inservice training session on portion control was conducted for the cafeteria employees. A filmstrip, "Dishing It Out," by Chiquita Brands, Incorporated was used to introduce the topic. After discussing the importance of portion control to the validity of the study, food portioning of menu items to be used in the study was demonstrated. Each employee was asked to demonstrate proper portion control of selected menu items. The program received high ratings when evaluated by the employees at both schools.

Food consumption data were collected from the students in grades 1-3 at the school in Assumption Parish where the traditional method of serving school lunch was used. Self-adhesive, removable labels were used to number each tray for identification purposes. The number was lifted from the tray and attached to the food consumption rating card used for that student when the tray was return and rated. Food consumption was measured using the visual estimation method. If food was traded, both trays involved were eliminated from the study.

Food consumption of students in grades 1-3 in the Lafourche Parish School using "offer versus serve" (experimental group) was conducted one week later. Identical menus, same days of the week, standard procedures, and same food consumption raters (Appendix J) were used. A substitution was made in the menu on the third day of the study at the school implementing the traditional method. Peaches were substituted for apricots because this item was not available (see Appendix H for menus as served).

Treatment of Data

After all the food consumption data were collected and compiled, each of the null hypotheses was tested on the basis of the chi-square statistic using the .05 level of significance. Since the researcher was primarily interested in a level of consumption which was more likely to meet one-third of the Recommended Dietary Allowances (U. S. Department of Agriculture, 1977), the categories "less than one-half serving" and "one-half or more serving" were used to test the null hypothesis. This information was obtained from the food consumption rating scale.

CHAPTER TWO

Analyses of Data

The data were analyzed to determine the effects of the "offer versus serve" method on the consumption of school lunches by students in grades 1-3 if nutrition-related achievement was similar. Eight null hypotheses were tested on the basis of the chi-square statistic using the .05 level of significance. A 2 X 2 contingency table was constructed for each menu item consumed and the chi-square computed by the formula: (Garret and Woodworth, 1966)

$$x^2 = \frac{N(AD - BC)^2}{(A + B)(C + D)(A + C)(B + D)}$$

The smaller the chi-square value, the greater the probability that the difference in consumption was not significant. The larger the chi-square, the greater the probability of a real difference in consumption between the two methods.

The following tables depict the serving method and the percentage of students eating "one-half or more" of each menu item.

The frequency distribution tables show the consumption pattern of each menu item by serving method.

Hypothesis 1

There is no significant difference in the consumption of meats or meat alternates when the "offer versus serve" method is implemented.

Table 3

Student Consumption of Meat Item by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	230	250	480
No. of students consuming one-half or more serving	557	599	1,156
Total	787	849	1,636

$x^2 = .01^a$

[a]Not significant at the .05 level

Analysis

Data from the three days of the study were compiled and presented in Table 3. A chi-square value of .01 was obtained. This was not significant. Table 4 illustrates by serving method the percentage of students who ate "one-half or more" of the meat item. Since there was no significant

difference in the consumption of the meat item, the null hypothesis was accepted.

Table 4

Percentage of Students Eating "One-Half or More" of Meat Item by Serving Method

Method	Percentage
"Offer vs Serve"	70.8
Traditional	70.6

Observations

A greater proportion of students chose to eat "none" of the meat item with the "offer versus serve" method. When the traditional method was used, a larger number of students tasted the menu item. Although more students ate "all" the meat item with the traditional method, the number who "ate about one-half" in the other method helped to equalize the proportion of students who ate "one-half or more."

Table 5

Frequency Distribution of Student Consumption of Meat Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	173	116
Tasted	28	86
Ate About 1/3	29	68
Ate About 1/2	134	54
Ate About 2/3	35	55
Ate Almost All	20	77
Ate All	368	413

Hypothesis 2

There is no significant difference in the consumption of combination dishes when the "offer versus serve" method is implemented.

Table 6

Student Consumption of Combination Dish
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	52	79	131
No. of students consuming one-half or more serving	352	364	716
Total	404	443	847

$x^2 = 3.98^a$

[a]Significant at the .05 level

Analysis

A combination dish was served on only one day of the study. The data are presented in Table 6. The value of chi-square reported was 3.98. This chi-square value was significant at the .05 level of confidence. Table 7 contains the percentage of students by serving method who ate "one-half or more" of the combination dish. A larger percentage of students ate "one-half or more" of this item when "offer versus serve" was implemented. Since there was a significant difference in the consumption of this menu item, the null hypothesis was rejected.

Table 7

Percentage of Students Eating "One-Half or More" of Combination Dish by Serving Method

Method	Percentage
"Offer vs Serve"	87.1
Traditional	82.2

Observations

The "ate none" category in the "offer versus serve" method is the smallest when compared to other categories of both methods. The categories, "none," "tasted," "ate one-third," and "ate one-half" are similar.

The traditional "ate all" category comprises the greatest number of students in both methods.

In comparing the methods, the "ate two-thirds" category for "offer versus serve" is substantially greater than the companion category for the traditional method while the traditional "ate all" category was substantially greater.

Table 8

Frequency Distribution of Student Consumption of Combination Dish by Serving Method

	"Offer vs Serve"	Traditional
Ate None	9	35
Tasted	16	27
Ate About 1/3	27	17
Ate About 1/2	20	17
Ate About 2/3	102	21
Ate Almost All	24	21
Ate All	206	305

Hypothesis 3

There is no significant difference in the consumption of vegetables when the "offer versus serve" method is implemented.

Table 9

Student Consumption of Vegetable Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	268	565	833
No. of students consuming one-half or more serving	923	723	1646
Total	1,191	1,288	2,479

$x^2 = 126.23^a$

[a]Significant at the .01 level

Analysis

Data on vegetable consumption indicated that the chi-square value was significant at the .01 level of confidence. The serving method did make a difference in the consumption of vegetables. A chi-square value of 126.23 was obtained from the data presented in Table 9. A larger percentage of students ate "one-half or more" of the vegetable item with the "offer versus serve" method as evidenced in Table 10. The null hypothesis was, therefore, rejected.

Table 10

Percentage of Students Eating "One-Half or More" of Vegetable Item by Serving Method

Method	Percentage
"Offer vs Serve"	77.7%
Traditional	56.1%

Observations

Regardless of serving method used, the largest number of students placed in the categories "ate all" and "ate none." However, the "ate all" category in the "offer versus serve" method comprises the greater proportion of students. Approximately the same proportion of students were in the "ate none" category despite the method used. Twice as many students tasted the vegetable when "offer versus serve" was implemented.

Table 11

Frequency Distribution of Student Consumption of Vegetable Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	384	398
Tasted	224	111
Ate About 1/3	20	56
Ate About 1/2	19	24
Ate About 2/3	15	34
Ate Almost All	213	92
Ate All	826	573

Hypothesis 4

There is no significant difference in the consumption of fruits when the "offer versus serve" method is implemented.

Table 12

Student Consumption of Fruit Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	372	346	718
No. of students consuming one-half or more serving	793	934	1727
Total	1,165	1,280	2,445

$x^2 = 7.08^a$

[a]Significant at the .01 level

Analysis

Data presented in Table 12 indicate a chi-square value of 7.08, significant at the .01 level of confidence. The null hypothesis was rejected since there was a significant difference in consumption of fruits with the two methods of serving. However, since a substitution was made in this menu item in the school implementing "offer versus serve," the validity of this finding is questionable. The researcher believed that peaches were preferred to apricots, thus affecting the outcome of the comparative study of this menu item. Data presented in Table 13 indicate that a larger percentage of students ate "one-half or more" of the fruit item when the traditional method of serving was used.

Table 13

Percentage of Students Eating "One-Half or More" of Fruit Item by Serving Method

Method	Percentage
"Offer vs Serve"	68.1
Traditional	73.0

Observations

Consumption of this menu item was very similar when comparing "offer versus serve" and the traditional method. More students placed in the categories "ate all" and "ate none" in both methods. However, more students ate "none" of the fruit when "offer versus serve" was implemented, and more students ate "all" when the traditional method was used.

Table 14

Frequency Distribution of Student Consumption of Fruit Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	290	203
Tasted	56	89
Ate About 1/3	26	54
Ate About 1/2	28	38
Ate About 2/3	10	33
Ate Almost All	37	69
Ate All	718	794

Hypothesis 5

There is no significant difference in the consumption of salads when the "offer versus serve" method is implemented.

Table 15

Student Consumption of Salad Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	647	647	1,294
No. of students consuming one-half or more serving	542	630	1,172
Total	1,189	1,277	2,466

$x^2 = 3.47^a$

[a]Not significant at the .05 level

Analysis

Data compiled from the study are presented in Table 15. The chi-square value of 3.47 is not significant. Table 16 demonstrates this difference in percentages. The null hypothesis was accepted.

Table 16

Percentage of Students Eating "One-Half or More" of Salad Item by Serving Method

Method	Percentage
"Offer vs Serve"	45.6
Traditional	49.3

Observations

The consumption patterns for the two methods were similar in that the majority of students were found within the two categories, "ate all" and "ate none," regardless of serving method used. However, more students ate "none" of the salad item when the "offer versus serve" method was used. The consumption patterns differed in that more students tasted the salad item when the traditional method was used. Approximately four times as many students ate "two-thirds" of the salad item when the traditional method was used.

Table 17

Frequency Distribution of Student Consumption of Salad Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	539	350
Tasted	69	202
Ate About 1/3	39	95
Ate About 1/2	39	45
Ate About 2/3	15	55
Ate Almost All	48	111
Ate All	440	419

Hypothesis 6

There is no significant difference in the consumption of breads when the "offer versus serve" method is implemented.

Table 18

Student Consumption of Bread Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	204	278	482
No. of students consuming one-half or more serving	580	568	1,148
Total	784	846	1,630

$x^2 = 9.13^a$

[a]Significant at the .01 level

Analysis

The chi-square value of 9.13 calculated from the data in Table 13 was significant at the .01 level of confidence. The null hypothesis was rejected since the difference in consumption of the bread item was significant. Table 19 identifies the percentage of students eating "one-half or More" of the bread item by serving method. A higher consumption rate was observed with "offer versus serve."

Table 19

Percentage of Students Eating "One-Half or More" of Bread Item by Serving Method

Method	Percentage
"Offer vs Serve"	74.0
Traditional	67.1

Observation

The consumption pattern of bread was similar for both methods. The majority of students were found in the "ate all" and "ate none" categories, and the other categories compared favorably. The greatest difference in the two methods of serving appeared in the "ate two-thirds" category with the traditional method having a two-to-one ratio.

Table 20

Frequency Distribution of Student Consumption of Bread Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	127	185
Tasted	47	45
Ate About 1/3	30	48
Ate About 1/2	37	60
Ate About 2/3	20	42
Ate Almost All	41	71
Ate All	482	395

Hypothesis 7

There is no significant difference in the consumption of dessert when the "offer versus serve" method is implemented.

Table 21

Student Consumption of Dessert Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	206	260	466
No. of students consuming one-half or more serving	998	1,032	2,030
Total	1,204	1,292	2,496

$x^2 = 3.73^a$

[a]Not significant at the .05 level

Analysis

The chi-square value was not significant at the .05 level of confidence. Table 21 presents the data which indicate that the difference in consumption of the dessert item was insignificant. The percentage of students eating "one-half or more" of the dessert item is shown in Table 22. The null hypothesis was accepted because the difference was not statistically significant.

Table 22

Percentage of Students Eating "One-Half or More" of Dessert Item by Serving Method

Method	Percentage
"Offer vs Serve"	82.9
Traditional	79.9

Observations

Consumption patterns for the dessert item were very similar when comparing the two methods in that more students were found in the categories, "ate all" and "ate none" regardless of method used. However, more students ate "all" of the dessert item when the "offer versus serve" method was used, and more students ate "none" when the traditional method was used. The greatest difference appeared in the category of "ate two-thirds" with the traditional method having a two-to-one ratio.

Table 23

Frequency Distribution of Student Consumption of Dessert Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	124	149
Tasted	57	66
Ate About 1/3	25	45
Ate About 1/2	35	38
Ate About 2/3	22	52
Ate Almost All	28	51
Ate All	913	891

Hypothesis 8

There is no significant difference in the consumption of milk when the "offer versus serve" method is implemented.

Table 24

Student Consumption of Milk Item
by Serving Method

	"Offer vs Serve"	Traditional	Total
No. of students consuming less than one-half serving	216	223	439
No. of students consuming one-half or more serving	974	1,062	2,036
Total	1,190	1,285	2,475

$x^2 = .27^a$

[a]Not significant at the .05 level

Analysis

Data presented in Table 24 indicate a chi-square value of .27. This value was not significant at the .05 level of confidence. The null hypothesis was, therefore, accepted. Table 25 demonstrates the small difference in the percentage of students drinking "one-half or more" of the milk item according to the serving method implemented.

Table 25

Percentage of Students Drinking "One-Half or More" of Milk Item by Serving Method

Method	Percentage
"Offer vs Serve"	81.8
Traditional	82.6

Observations

More students were found in the "ate all" category regardless of method of serving. A greater proportion of students ate "none" when the "offer versus serve" method was used. Other categories were very similar in both methods.

Table 26

Frequency Distribution of Student Consumption of Milk Item by Serving Method

	"Offer vs Serve"	Traditional
Ate None	114	74
Tasted	65	65
Ate About 1/3	37	84
Ate About 1/2	57	79
Ate About 2/3	36	81
Ate Almost All	42	69
Ate All	839	862

CHAPTER THREE

Summary, Findings, Interpretation of Findings, and Recommendations

The purpose of this study was to determine the effects of the "offer versus serve" method on consumption of the school lunch by students in grades 1-3 when nutrition-related achievement was similar. The sample included students in grades 1-3 in two public schools in neighboring parishes, Lafourche and Assumption. The Lafourche Parish school was implementing the "offer versus serve" method, and the Assumption Parish school was using the traditional method of serving lunch. Nutrition achievement of students in both schools was determined by nutrition achievement tests which had been validated for content and tested for reliability. The mean scores of students in the two schools compared favorably.

Food consumption data were collected from the students in grades 1-3 using the traditional method of serving at one school. This study was conducted on Monday, Wednesday, and Friday of the same week. The following week, food consumption data were collected from students in grades 1-3 in the school using the "offer versus serve" method. Identical menus, same days of the week, standard procedures, and the same food consumption raters were used.

Findings

An analysis of the data revealed these findings:

1. There was no significant difference at the .05 level of confidence in school lunch consumption of meat or meat alternates when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

2. There was a significant difference at the .05 level of confidence in school lunch consumption of combination dishes when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

3. There was a significant difference at the .01 level of confidence in school lunch consumption of vegetables when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

4. There was a significant difference at the .01 level of confidence in school lunch consumption of fruits when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

5. There was no significant difference at the .05 level of confidence in school lunch consumption of salads when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

6. There was a significant difference at the .01 level of confidence in school lunch consumption of breads when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

7. There was no significant difference in school lunch consumption of desserts when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

8. There was no significant difference in school lunch consumption of milk when comparing "offer versus serve" implemented and "offer versus serve" not implemented.

Further analysis revealed some general findings which supported the conclusions drawn from the tested hypotheses. Food consumption patterns were very similar when comparing the two methods. A noticeable similarity was evidenced in the consumption patterns of fruit, salad, bread, dessert, and milk. Even though there was some differences in the meat and combination dish consumption patterns, there were not outstanding differences when comparing methods.

It was observed from the data that students displayed a definite like or dislike for tuna fish, whereas, the majority liked tacos. Vegetable, fruit, and salad items rated the lowest in acceptability when compared to other menu items. This finding was in agreement with previous studies (Head and Weeks, 1975; Jansen and others, 1975).

Overall the "ate none" and "ate all" categories for both methods contained the majority of students in most instances for each food item. This indicates that preference for an item, and perhaps the specific food of that item, are important considerations of consumption irrespective of method.

Interpretation of Findings

The findings of this study could be useful for school food service personnel faced with the decision of implementing "offer versus serve" in the lower grades. Results indicated that there was no significant difference in consumption of the school lunch in four out of the eight menu items observed when "offer versus serve" was implemented. In three of the instances in which the null hypotheses were rejected, consumption was favored by the "offer versus serve" method. A larger percentage of students ate "one-half or more" of the bread, vegetable, and combination dish items when the "offer versus serve" method was implemented. The consumption of the fruit item was favored by the traditional method. However, the validity of this finding is questionable since a substitution of peaches for apricots was made. Research indicates that student preferences appear to be highly correlated with food consumption (Jansen and Harper, 1978; Head, Gresbrecht, and Johnson, 1977).

The study indicated that neither method of serving was superior to the other in terms of food consumption, thus supporting the theory that food consumption was not adversely affected when "offer versus serve" was implemented. In fact, consumption was improved in three cases out of four when the null hypothesis was rejected.

Recommendations

It appears that implementation of "offer versus serve" in grades 1-3 deserves merit as a means of cutting cost in school lunch since no negative effects on consumption have been reported. This study, although limited in scope, showed that food consumption was not adversely affected. Perhaps the answer to improving nutritional habits of students lies more in education in order for students to try new foods. It is, therefore, recommended that "offer versus serve" be implemented, as well as, a nutrition education program involving students, parents, teachers, and food service personnel.

CHAPTER FOUR

Review of Related Literature

Historical Perspective of the School Lunch Program

The history of school lunch can be traced to European countries as early as the eighteen hundreds. In the early part of the 20th Century, some of the large cities in the United States began to feed hungry children at school. This practice continued through the depression years, and by 1925, the practice of serving hot noon lunches had spread to rural schools. Federal assistance to the school lunch programs began in 1933. This eventually led to the passage of the National School Lunch Act of 1946 (U. S. Statues at Large, 1946) which established school food service as an integral part of the United States' educational system.

The Child Nutrition Act of 1966 (U. S. Statues at Large, 1966) significantly expanded the program to include the School Breakfast Program and the Free and Reduced Meal Programs. The seventies brought with it a concern for waste and Congress mandated the "offer versus serve" program for high school students (Public Law 94-105, 1975). Another effort to curb waste was the 1977 amendment (Public Law 95-166, 1977) providing funds to individual states to

implement a Nutrition Education and Training Program (O'Rourke and Koizumi, 1982).

The Republicans in 1980 promised to eliminate waste, fraud, and abuse. Some of the subsidy for the paying child was cut, and funding for nutrition education and training was curtailed (Applebaum, 1982; O'Rourke and Koizumi, 1982). "Offer versus serve" became optional to all students as a result of the Omnibus Budget Reconciliation Act of 1981 (U. S. Statutes at Large, 1981).

The fate of school lunch today is uncertain. If the Reagan administration eliminates the subsidy for the paying child as they have proposed, this would nullify the intent of the National School Lunch Act which was to safeguard the health of the children of this country. Congress had hoped to guarantee the nutritional adequacy of school diets by making available to all an inexpensive, nutritious meal. The school food service programs were intended to provide learning experiences that would help to improve children's food habits with the ultimate goal of producing physically fit adults (State of Louisiana Department of Education, 1976). Applebaum (1982) fears the possibility of some programs being discontinued if too few of the paying students choose to pay the increased costs. This would leave students, even those on free lunch, with no school lunch. However, the feasibility of providing one-third of the Recommended Dietary Allowances, as proposed by the

Secretary of Agriculture, is being questioned (U. S. General Accounting Office, 1981).

In order to assure nutritional adequacy, standards for the Type A lunch were established to meet the nutritional needs of school-age children. To achieve these standards, the United States Department of Agriculture requires schools to offer the Type A pattern which, for the 10-12 year olds, includes: 2 oz. edible portion of meat or meat alternate; 3/4 cup total of at least two fruits and/or vegetables; one slice of whole grain or enriched bread; and 1/2 pint milk. These amounts can be easily adjusted for older and younger students (United States Department of Agriculture, 1977).

In May, 1980, the United States Department of Agriculture updated the meal pattern to incorporate the 1980 version of the Recommended Dietary Allowances. Again, they recommended larger servings for older students and specified that three ounces of meat or meat alternate should be served daily to these students and ten slices of bread per week (U. S. General Accounting Office, 1981). This reflected a continuation of the concern for nutrition of school-age children.

The Problem of Plate Waste

Plate waste, food served but not eaten, has been of concern to almost every segment of the population. Particularly concerned are Congress, the United States

Department of Agriculture, school food service personnel, and nutritionists. The public is concerned because of the tax dollars being wasted. The press has helped mediate this concern (Plate Waste: Part I, 1976; U. S. General Accounting Office, 1981).

Food waste is costly from the economics standpoint; but more important is the fact that returned food indicates children are not getting the nutrients the lunch was intended to provide (Head and Weeks, 1977; Jansen and Harper, 1978).

Many plate waste studies have been conducted (Griffee, 1979; Carver and Patton, 1958; U. S. General Accounting Office, 1981; Jansen and Harper, 1978), and it appears that a variety of factors may be involved. It is important to understand that a certain amount of waste can be expected in school lunch because it is impossible to standardize the eating habits of children. It is also difficult to standardize the serving size to satisfy nutritional needs of the individual child (Lachance, 1976). Another consideration is the fact that food waste is not limited to school lunch (Plate Waste: Part II, 1976). Waste to some extent is the result of a deeply ingrained American attitude of national abundance and personal affluence. There is evidence that food is wasted in the home (Lachance, 1976). People tend to take more food than they can eat, or they eat

more than they need (Project Waste, 1976). Children learn habits of waste at home according to Lachance (1976).

Factors affecting plate waste of school lunches mentioned in the literature included the following:

1. serving size (Carver and Patton, 1958)
2. appearance of food (Carver and Patton, 1958)
3. familiarity of foods (Carver and Patton, 1958)
4. cafeteria facilities (Jansen and Harper, 1978)
5. exercise of children (Carver and Patton, 1958
6. peer pressure (Carver and Patton, 1958)
7. attitude of teachers (Perkins, Roach, and Vaden, (1980)
8. health of individual children (Carver and Patton, 1958)
9. quality of cafeteria supervision (U. S. General Accounting Office, 1981)
10. length of the lunch period (U. S. General Accounting Office, 1981)
11. paid, reduced, or free lunch (U. S. General Accounting Office, 1981)
12. food preferences related to sex, race, or ethnic background (U. S. General Accounting Office, 1981)
13. preparation of food on site (Jansen and Harper, 1978)
14. food served at the proper temperature (Jansen and Harper, 1978)
15. quality of food: color, texture, and flavor (Jansen and Harper, 1978)
16. friendly and cooperative staff (Jansen and Harper, (1978)

17. food choices within the menu pattern (Jansen and Harper, 1978)

18. student input into the menu (Jansen and Harper, 1978; U. S. General Accounting Office, 1981)

19. method of preparation, especially vegetables (Hunt and others, 1958)

20. visual perception of mass (Head and Weeks, 1977)

21. context in which foods are presented (Birch, 1980)

22. nutrition education (Lachance, 1976; U. S. General Accounting Office, 1981)

23. noise level in the lunchroom (Jansen and Harper, 1978)

24. sanitation (Determining What's Going Down and Out, 1976)

25. variation in food acceptance from day to day, not associated with a particular food (Carver and Patton, 1958)

26. scheduling of recess before lunch (Ruppenthal, 1978)

27. offer versus serve (U. S. General Accounting Office, 1981)

28. attitude, pride, and service of personnel (U. S. General Accounting Office, 1981)

Food Preferences

Research indicates that student preferences appear to be highly correlated with food consumption (Jansen and Harper, 1978; Head, Gresbrecht, and Johnson, 1977).

Most studies reveal a high consumption rate for milk (Jansen et al., 1975; Carver and Patton, 1958; Lachance, 1976). Although skim milk was rated poorly, according to Jansen and others (1975), it was consumed by those who made

it their choice. Chocolate milk was generally preferred to unflavored milk (Jansen et al., 1975). Guthrie (1977) reported that while offering chocolate milk increased milk consumption, it lowered food consumption.

The Utah State Board of Education conducted a broad study of elementary school students and found that plate waste scores for main dishes were below 15 percent of total food waste, indicating that the majority of main dishes had good acceptance (Determining What's Going Down or Out, 1976). Students liked sandwiches, hamburgers, fried chicken, pizza, spaghetti, beans, and frankfurters (Jansen et al., 1975).

Fruits and vegetables rated the lowest in acceptability in all studies examined (Head and Weeks, 1975; Jansen and others, 1975). Vegetables and fruit were responsible for 28 percent of the total food waste in the Utah Study (Determining What's Going Down or Out, 1976). Preferred vegetables included potatoes, corn, green beans, cooked carrots, and peas; while green and yellow vegetables were reported to be the least preferred (Jansen and others, 1975).

Generally, bread rated high in consumption (Jansen and others, 1975). It accounted for less than 9 percent of the total food wasted in the Utah Study (Determining What's Going Down or Out, 1976). However, bread was served as pizza crust, burritos, sloppy joe rolls, sweet rolls, and

other forms. Plain bread was not as acceptable as other forms. According to Head and Weeks (1975), girls ate less of starchy foods than of other food groups.

Desserts were highly acceptable (Jansen and others, 1975). In the Utah Study, desserts accounted for under 10 percent of the total plate waste. It was surprising, however, that some of the desserts having high acceptability scores also had high waste scores (Determining What's Going Down or Out, 1976).

Nutrition Education

The Nutrition Education and Training (NET) Program was established in 1977 with the passage of Public Law 95-166. The program provided funds to individual states to implement a Nutrition Education and Training Program. The program is administered at the federal level by the U. S. Department of Agriculture and at the state level by the Department of Education. Funding is provided to states on the basis of enrollment in schools and childcare centers. Before the budget cuts, the amount provided was 50 cents per child. Louisiana was receiving over $500,000 per year to implement the Nutrition Education and Training Program (Louisiana Department of Education, 1981).

The goal of nutrition education programs in schools is to change children's nutrition-related knowledge, attitudes, and behaviors with the long-range goal of improving

nutritional and health status (St. Pierre and Rezmovic, 1982).

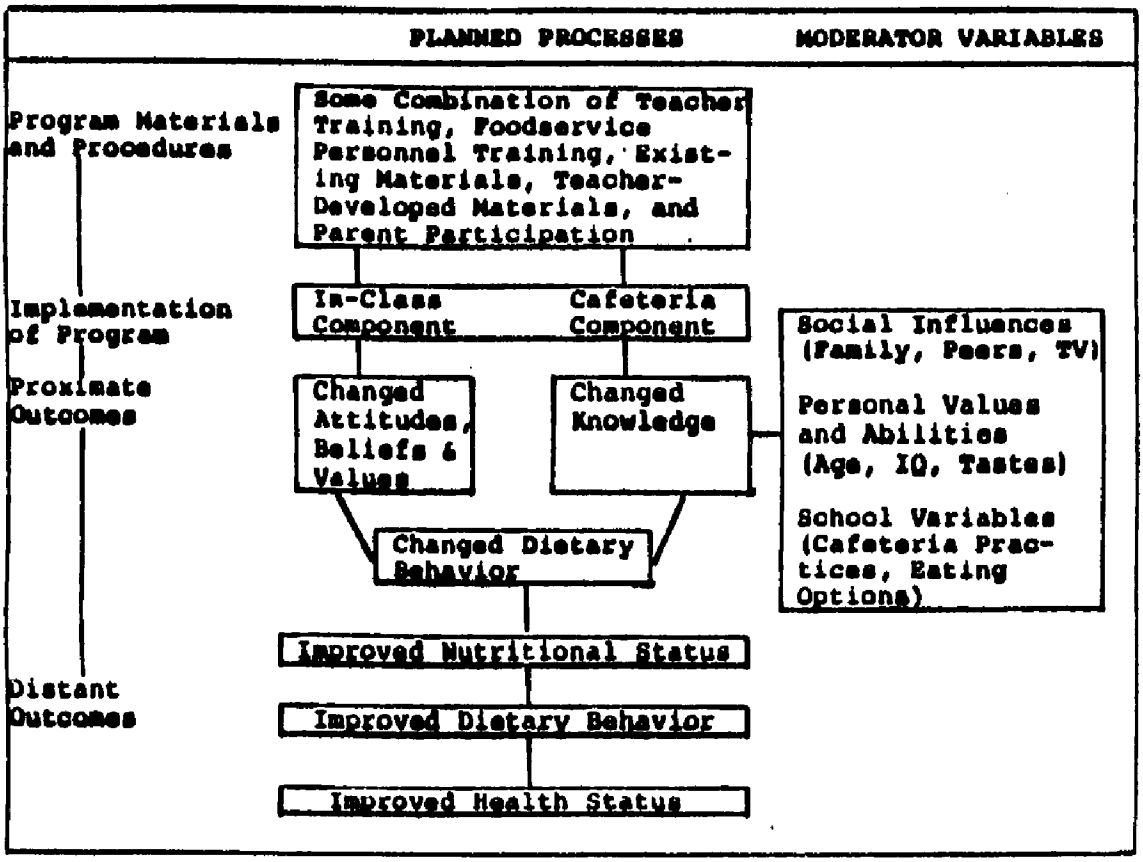
An evaluation of the Nutrition Education and Training Program was deemed necessary before the federal government could reauthorize the program. This evaluation was funded by the U.S. Department of Agriculture to determine the effectiveness of the Nutrition Education and Training Program. The evaluation team, headed by Robert St. Pierre, developed an organizing framework to describe the components of the education program. The model is presented on the following page (St. Pierre and Rezmovic, 1982:62).

After two years in operation, it was found that the Nutrition Education and Training Program appeared to be making progress as programs were operating in almost all the states. Large positive effects were reported on children's nutrition-related knowledge, on willingness to select and taste new foods, on reported food preference, and on food-related attitudes. The effects on knowledge appeared to be the strongest (St. Pierre and Rezmovic, 1982).

Various programs funded through Nutrition Education and Training also reported successes of nutrition education (McDonald, Brun, and Esserman, 1980; Smith and Justice, 1979; Smith and James, 1980; Chun, 1981; Miller, 1981; Dorsey, 1981).

Because of the concern for nutrition education, research in this area is expanding. In addition,

Components of the Education Program



recognition of the importance of the behavioral aspects of nutrition have increased the emphasis on the affective domain of teaching nutrition. As a result, social science methodology is becoming more prevalent in nutrition education research (Wardlaw, 1981; Birch, 1981; Sims, 1981; Gillespie, 1981).

Another key to long-term success of overall eating behavior modification is motivation (Coates, 1977). Birch (1981) concluded that, given the evidence, he was not optimistic that extrinsic motivation (to "coerce" the individual) would affect long-term changes in eating behavior. Lachance pointed out that there would be negative psychological attitudes when food disliked by the child was encouraged too strongly (Lachance, 1976).

Research indicated that nutrition education appears to be the feasible approach to improving the nutritional adequacy of school children.

Measures of Food Consumption/Plate Waste

The measurement of either plate waste or food consumption is a valuable tool in answering questions about nutrition, economics, and the effectiveness of school lunch programs.

In reviewing the literature, several methods of measuring food consumption or waste appeared. The three considered were: (1) weighing the plate waste,

(2) visually estimating either the food consumed or the food wasted, and (3) having the child rate his consumption.

Weighed Plate Waste

Plate waste can be measured by weighing the portion of food as served and weighing the amount of food remaining on the plate. The difference is the amount eaten (Lachance, 1976). Weighing can be done on individual portions (Jansen and Harper, 1978) or on pooled plate waste (Carver and Patton, 1958). The procedure requires a precise scale, many helpers, and a great deal of time. It is the recommended method when precision is important (Lachance, 1976).

Visual Estimation

This method of measuring food consumption requires observers to rate individual menu items on each child's tray at the end of the meal. Observers are trained to recognize a full portion and to estimate the amount left according to a designated scale. Lachance (1976) recommended a five-point scale (all, 3/4, 1/2, 1/4, or less, none).

Acredolo and Pick (1975) used a four-point scale in their study comparing two lunch programs (nothing eaten, one bite eaten, more than one bite but not whole portion eaten, whole portion eaten). Inter-observer reliability for untrained observers varied from 88 to 93 percent.

Chmielinski and White (St. Pierre and Glotzer, 1981) used a four-point scale (0, 1/3, 2/3, all food remaining).

Inter-observers reliability was measured at 90 percent. There was 80 percent agreement between visual estimates and weighed waste using a non-parametric comparison.

St. Pierre and Glotzer (1981), as part of their evaluation of the nutrition education and training program in Nebraska, compared three methods of measuring food consumption: visual estimates, child ratings, and weighed plate waste. They found that trained observers can make visual estimates that correlate highly (about .93) with weighed waste.

Child Ratings

In the child-rating method, children rate their own trays from memory shortly after lunch. Head and others (1977) used a five-point scale (all, most, about half, just tried it, none). Child ratings are useful when accuracy of plate waste is not needed. Child ratings had a correlation to weighed waste of about .75 (St. Pierre and Glotzer, 1981).

Other Methods

Measuring food acceptability has proved to be a good method of measurement to estimate consumption. The people being surveyed rate items on a hedonic scale, which denotes degree of liking (Acredolo and Pick, 1975). The hedonic scale can be used to rate foods presented by item name only, or it can be used for rating foods actually served. The

first measures attitude only, whereas, the second scale is also a sensory test; both are effective measures. Research with adults has shown a correlation of food consumption (determined by plate waste or by servings selected) and hedonic ratings to be between 0.5 and 0.7 (Head, Giesbriecht, Johnson, 1977).

Acredolo and Pick (1975) reported the results of a two-year study conducted with 9-11 year old children measuring the acceptability of school-served food items using three methods: a hedonic scale (HED), a scale on which students estimated the amount they had eaten (AMT), and weighed plate waste. Reliability was highly significant for the HED scale and significant for the AMT scale for all but one item. AMT scores were more closely correlated with food consumption than were HED scores, but both scales proved to be good indicators of consumption. The researchers suggested using a three-point scale since it appeared that students may not discriminate accurately enough to warrant five response alternatives. They also indicated that the additional cost of handling the data was not justified.

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APPENDICES

APPENDIX A

LETTERS OF PERMISSION

323 Rosemont Drive
Thibodaux, LA 70301
January 17, 1983

Mr. Lynn Aysenne
Superintendent of Schools
Assumption Parish
Drawer B
Napoleonville, LA 70390

Dear Mr. Aysenne:

Thank you for considering the use of a lower elementary school in your parish for my dissertation study. The research problem I have selected is a comparison of school lunch consumption of students in grades 1-3 in terms of serving method (offer versus serve implemented and offer versus serve not implemented). The study will require two schools with grades 1-3, each using one of the different methods. The schools must be similar in enrollment, size of lunch program, number of free and reduced-price lunches, and nutrition education level. I would like your permission to use Labadieville Primary School as one of the two schools.

After obtaining permission from the principal, teachers, and school lunch personnel involved, the following events have been planned as part of my study:

February - administer a nutrition achievement test at both schools
End of March - Inservice training for cafeteria employees
April 11, 13, 15, - Food Consumption Study

Your permission and cooperation will be sincerely appreciated.

Sincerely,

Faye Robichaux

WILFRED DAIGLE
PRESIDENT

NORMAN MABILE
VICE--PRESIDENT

LYNN AYSENNE
SUPERINTENDENT

ASSUMPTION PARISH SCHOOL BOARD

NAPOLEONVILLE, LA. 70390

MEMBERS:
CLARENCE SOUTHALL
STERLING J. ROBICHAUX, SR.
WALTER THIBODEAUX
CHARLES J. BREAUX, SR.

LAWRENCE HOWELL
WILFRED DAIGLE
LOUIS LANDRY
NORMAN MABILE
LEONARD BREAUX

January 20, 1983

Miss Faye Robichaux
323 Rosemont Drive
Thibodaux, La. 70301

Dear Miss Robichaux:

Permission is hereby granted to conduct your research on a comparison of school lunch consumption of students in grades 1-3 in terms of serving method.

Personnel involved have been informed; therefore, all further contacts and communications can be conducted through them.

If you need further assistance, please contact me at your convenience.

Sincerely,

Lynn Aysenne, Superintendent
Assumption Parish Public Schools

LA:yha

Enclosure

cc: Mrs. Mildred Sylvester, Principal
Labadieville Primary School

Mrs. Lucille Simoneaux, Food Service
Director

ROY L. SOBERT SR, PRESIDENT

JEFFREY J LEBLANC, SUPERINTENDENT

Lafourche Parish School Board

P O BOX 879
THIBODAUX, LOUISIANA 70302

January 21, 1983

Mrs. Faye Robichaux
323 Rosemont Drive
Thibodaux, LA 70301

Dear Mrs. Robichaux:

I am very happy to endorse your dissertation study and to consent to the use of our system's facilities for this purpose.

Permission is granted to do your research in Raceland Lower Elementary School, as I commented during our telephone conversation, with the following reservations:

1. Participation by the employees must be voluntary. No administrator, teacher, or lunchroom worker will be compelled to participate.

2. In the course of your research, all federal, state, and local laws, ordinances, and regulations must be complied with.

3. Neither the school nor the school board can participate in the cost of the program.

By providing the principal a copy of this letter, the principal will know that the permission and cooperation which you requested from me are granted and forthcoming.

With best wishes for a successful endeavor, I remain

Cordially yours,

Jeffrey J. LeBlanc
Superintendent of Schools

JJLeB:bb

LABADIEVILLE PRIMARY SCHOOL
Route 2, Box 170
Labadieville, Louisiana 70372
(504) 526-8220

February 21, 1983

Mrs. Faye Robichaux
323 Rosemont Drive
Thibodaux, LA 70301

Dear Mrs. Robichaux:

Your request to conduct your dissertation study meets with my approval.

The faculty and staff welcome you and pledge their cooperation as a means of making your study a success.

Good luck in your endeavor.

Sincerely,
Mildred D. Sylvester
Mildred D. Sylvester
Principal

RACELAND LOWER ELEMENTARY SCHOOL
MALCOLM FORET, PRINCIPAL
P. O. BOX 628
RACELAND, LOUISIANA 70394

February 8, 1983

Mrs. Faye Robichaux
323 Rosemont Drive
Thibodaux, Louisiana 70301

Dear Mrs. Robichaux:

Permission is granted concerning the use of our school for dissertation study. I understand that you would like to do a food consumption study of students in grades 1-3. You are planning to give a nutrition achievement test prior to the study to ascertain that the students in both schools have similar nutrition knowledge levels.

It is agreed that a letter to the student explaining voluntary participation and the option of not signing one's name to the nutrition test will be read.

Sincerely,

RACELAND LOWER ELEMENTARY

Malcolm Foret

Malcolm Foret
Principal

MF:ll

APPENDIX B

CORRESPONDENCE CONCERNING NUTRITION TEST

W. S. LAFARGUE ELEMENTARY SCHOOL
700 PLANTATION ROAD
THIBODAUX, LOUISIANA 70301

January 31, 1983

Mrs. Faye Robichaux
323 Rosemont Drive
Thibodaux, La. 70301

Dear Mrs. Robichaux:

Permission is granted concerning the use of our school for your dissertation study. I understand that you would like to validate and test the nutrition achievement test for reliability.

It is agreed that a letter to the parents and students explaining voluntary participation and the option of not signing their name to the nutrition test will be sent home.

Sincerely,

Oneil P. Andras

Oneil P. Andras

323 Rosemont Drive
Thibodaux, LA 70301
March 14, 1983

Mrs. Betty Dupont
W.S. Lafargue Elementary School
700 Plantation Road
Thibodaux, LA 70301

Dear Betty:

Thank you very much for your precious time and expertise in the development and validation of the nutrition achievement test for first and second graders that was used in conjunction with my school lunch consumption study. I am especially grateful for your cooperation in the testing procedures used to establish the reliability of the test. I know this took a lot of time and patience.

The nutrition test has been administered to both schools, and this phase of my study is now complete. Without your help, this would have been impossible.

Please extend my appreciation to the students who participated in the testing. Again, thanks for a job well done.

Sincerely,

Faye Robichaux

Same letter sent to:
Mrs. Cathy Landry
Mrs. Karen Morvant
Mrs. Mary Ann Naquin
Mrs. Patsy Smith
Mrs. Chris Toups

323 Rosemont Drive
Thibodaux, LA 70301
March 14, 1983

Mrs. Marie Kinchen
Thibodaux Elementary School
700 East Seventh Street
Thibodaux, LA 70301

Dear Marie:

Thank you very much for your precious time and expertise in the development and validation of the nutrition achievement test for third graders that was used in conjunction with my school lunch consumption study. I am especially grateful for your cooperation in the testing procedures used to establish the reliability of the test. I know this took time and patience.

The nutrition test has been administered to both schools, and this phase of my study is complete. Without your help, this would not have been possible.

Please extend my appreciation to the students who participated in the testing. Again, thanks for a job well done.

Sincerely,

Faye Robichaux

Same letter sent to:
Mrs. Elizabeth Yates
Mrs. Gail Chenier

To Be Read Before the Nutrition Achievement Test:

Dear Student:

The nutrition achievement test that your teacher is going to distribute is being given as part of my research study at Louisiana State University. I am asking that you participate as volunteers to take the nutrition achievement test. Your identity will not be revealed without your permission, and your performance will not be used for any additional projects. You do not have to sign your name. You may ask questions before and after the test.

Your cooperation will be appreciated very much.

Sincerely,

Mrs. Faye Robichaux

323 Rosemont Drive
Thibodaux, LA 70301
March 14, 1983

Ms. Zoe Blanchard
Labadieville Primary School
Labadieville, LA 70372

Dear Ms. Blanchard:

Thank you very much for administering the nutrition achievement test in my behalf. I appreciate your time, effort, and energy. Without your help, this initial phase of my study would have been very difficult.

The schools in my study did have similar mean scores on the nutrition achievement test, and I can proceed with the school lunch consumption study comparing the two methods of serving.

Again, thanks for participating in my study. Please extend my appreciation to your students in helping me with this project.

Sincerely,

Faye Robichaux

Same letter sent to:
All teachers that administered
the nutrition achievement test

323 Rosemont Drive
Thibodaux, LA 70301
March 14, 1983

Mr. George Babin, Principal
Thibodaux Elementary School
Thibodaux, LA 70301

Dear Mr. Babin:

Thank you very much for allowing the administering of the nutrition achievement test that was used in conjunction with my school lunch consumption study to be pilot tested in your school.

Your cooperation in this important phase of my study was sincerely appreciated.

Sincerely,

Faye Robichaux

Same letter sent to:
Mr. Oneil Andras

323 Rosemont Drive
Thibodaux, LA 70301
June 24, 1983

Mr. Jeffery LeBlanc
Superintendent of Schools
Lafourche Parish School Board
P. O. Box 879
Thibodaux, LA 70302

Dear Mr. LeBlanc:

My sincere appreciation is extended to you for supporting my dissertation study. It was a pleasure working in the Lafourche Parish School System. The school used in the study was very professionally administered. This contributed considerably to the smooth implementation of my study. The principal and staff were extremely cooperative, and this also made for an easier task.

The Food Consumption Study is now completed. A summary of findings, interpretations, and recommendations will be mailed to you as soon as possible.

You are to be commended for the excellence exhibited in your school system and for your interest in research.

Thanks for letting me share in your precious time and your excellent school facility.

Sincerely,

Faye Robichaux

323 Rosemont Drive
Thibodaux, LA 70301
June 24, 1983

Mrs. Mildred Sylvester, Principal
Labadieville Primary School
Route 2, Box 170
Labadieville, LA 70372

Dear Mrs. Sylvester:

Heartfelt thanks to you and your staff for the wonderful support and cooperation shown me throughout my dissertation study. It was a thoroughly delightful experience working with people exhibiting such a positive attitude. You and your staff have my highest regards in your professional areas of expertise.

Please extend my gratitude and appreciation to the assistant principal, teachers, secretary, cafeteria manager and staff, and janitors for their assistance. It was a most enriching and heartwarming experience to have worked with so many wonderful people.

My study is now completed. A summary of the findings, interpretations, and recommendations will be mailed to you as soon as possible.

Again, it was a pleasure working with you and your staff. Thanks for contributing to the success of my study.

Sincerely,

Faye Robichaux

323 Rosemont Drive
Thibodaux, LA 70301
March 14, 1983

Mrs. Mildred Sylvester, Principal
Labadieville Primary School
Labadieville, LA 70372

Dear Mrs. Sylvester:

Thank you for your cooperation in the testing phase of my school lunch consumption study. The mean scores on the nutrition achievement test were similar in the two schools tested, and I can proceed with my study.

I feel very fortunate to have had an opportunity to work with a principal who is dedicated and efficient. The success of the testing phase of my study is a tribute to the cooperative efforts of you and your staff.

I sincerely appreciate the time you have invested and the interest you have shown in my study.

Sincerely,

Faye Robichaux

Same letter sent to:
Mr. Malcolm Foret

APPENDIX C

CORRESPONDENCE CONCERNING INSERVICE TRAINING

323 Rosemont Drive
Thibodaux, LA 70301
April 7, 1983

Ms. Marguerite Naquin
and Cafeteria Staff
Labadieville Primary School
Route 2, Box 170
Labadieville, LA 70372

Dear Ladies:

Thank you very much for your participation in the inservice training on portion control. I appreciate very much your time and expertise in contributing to the success of my food consumption study. Without your help, my task would be impossible.

Thanks again for giving of yourselves and for the professional attitude you have shown toward your work.

Sincerely,

Faye Robichaux

Same letter sent to:
Ms. Gayle Robichaux
and Cafeteria Staff

323 Rosemont Drive
Thibodaux, LA 70301
April 11, 1983

Ms. Nancy Tanner
Association of Louisiana
State Department of Education
P. O. Box 44064
Baton Rouge, LA

Dear Ms. Tanner:

Enclosed are the pre-program approval forms and a list of the School Food Service Association of Louisiana members attending the inservice training on portion control. Your attention in crediting them with one hour of certification points will be appreciated.

Thank you very much for your cooperation in making it possible for these ladies to earn this credit.

Sincerely,

Faye Robichaux

APPENDIX D

LETTER TO PROFESSIONAL VOLUNTEERS RATING FOOD CONSUMPTION

323 Rosemont Drive
Thibodaux, LA 70301
April 25, 1983

Dr. Margaret Jolley
306 Cherokee
Thibodaux, LA 70301

Dear Dr. Jolley:

Words cannot adequately express my appreciation to you for the time, energy, and talent you so willingly and graciously gave toward the completion of my food consumption study. Without your help the observation method would have been impossible.

I feel very good about the study because of the dedication and expertise of the five of you who helped me. It was truly a gratifying experience to have worked with such professional and dedicated educators and home economists.

Thanks for the interest in, and support of, my study. You will be the first to know the results when my data is compiled.

Thank you again for the help you have given me!

Sincerely,

Faye Robichaux

Same letter sent to:
Mrs. Ruby Forrest
Mrs. Rea Gilbert
Mrs. Ceil Toups
Mrs. Beulah Weimer

APPENDIX E

LETTERS OF APPRECIATION TO SCHOOL FOOD SERVICE SUPERVISORS, PRINCIPALS, AND SUPERINTENDENTS

323 Rosemont Drive
Thibodaux, LA 70301
June 24, 1983

Mrs. Lou Simoneaux
School Food Service Supervisor
Assumption School Board Office
Plattenville, LA

Dear Mrs. Simoneaux:

My sincere appreciation and gratitude is extended to you for your wonderful cooperation and support with my dissertation study. Without your help, my study would have been impossible. It was very sweet and generous of you to assist in the coordination of the rating of trays. Your help was invaluable.

My food consumption study is now completed and the results have been analyzed. A summary of the findings, interpretations, and recommendations will be mailed to you as soon as possible.

You are to be complimented for an excellent school lunch program, and your employees used in the study are to be commended for their part in its success.

It was a very enriching and heartwarming experience to have worked with someone as professional and conscientious as you.

Thanks again for your expertise, assistance, and support.

With kindest regards,

Faye Robichaux

323 Rosemont Drive
Thibodaux, LA 70301
June 24, 1983

Mrs. Barbara Gauthier
Supervisor of Child Nutrition Programs
Lafourche Parish
School Board Office
P. O. Box 879
Thibodaux, LA 70301

Dear Barbara:

Thank you very much for your support and assistance with my dissertation study. Your ideas and suggestions were appreciated very much.

The results of my study have been analyzed. A summary of the findings, interpretations, and recommendations will be sent to you as soon as possible.

You are to be complimented for an excellent school lunch program, and your employees used in the study are to be commended for their part in its success.

Thanks again for your expertise, assistance, and support of my study.

Sincerely,

Faye Robichaux

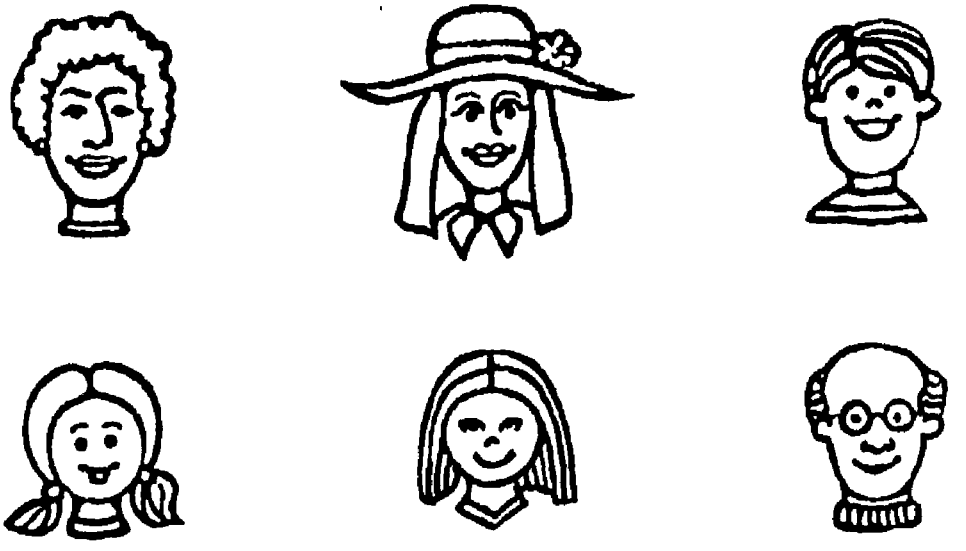
APPENDIX F

NUTRITION ACHIEVEMENT TEST 1

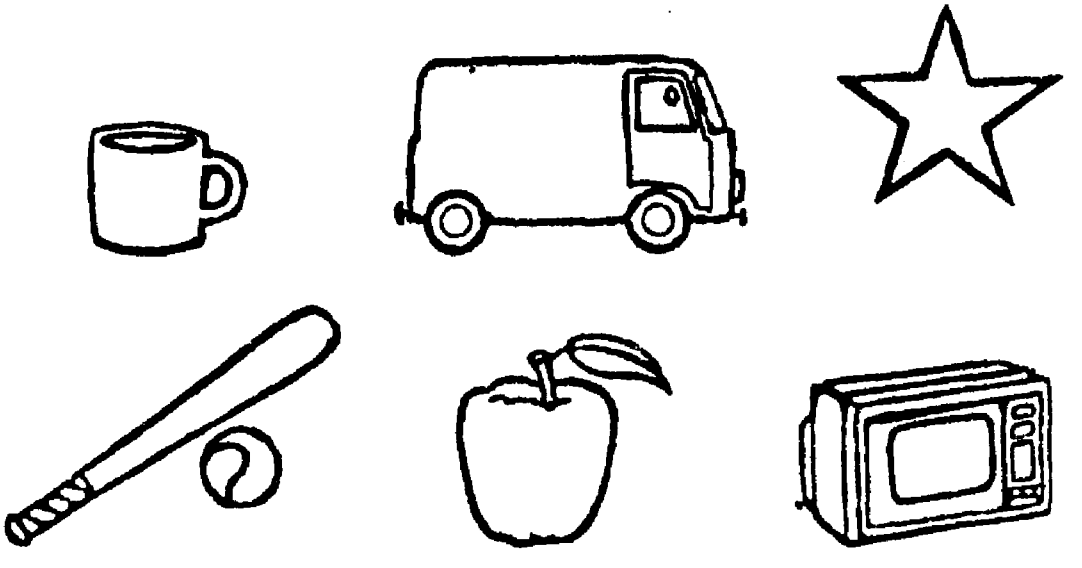
NUTRITION ACHIEVEMENT TEST 1

DIRECTIONS: MARK AN X THROUGH THE PICTURE BEING DESCRIBED IN EACH QUESTION.

PRACTICE QUESTION: THE PICTURE OF THE PERSON WHO IS WEARING A HAT



PRACTICE QUESTION: THE PICTURE OF A FOOD



1. THE ONE THAT IS ALIVE

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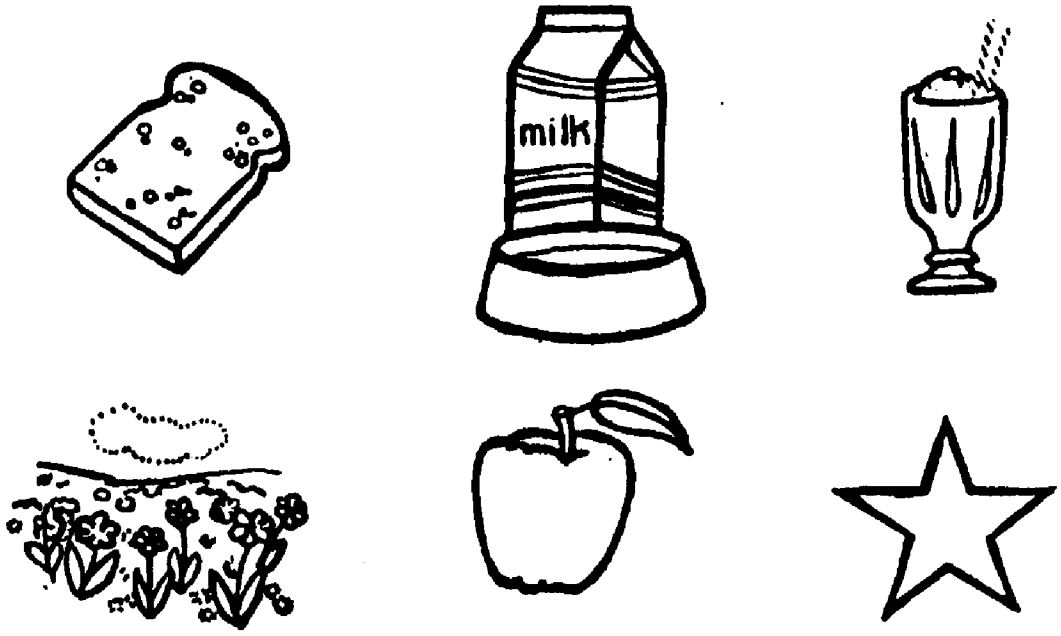
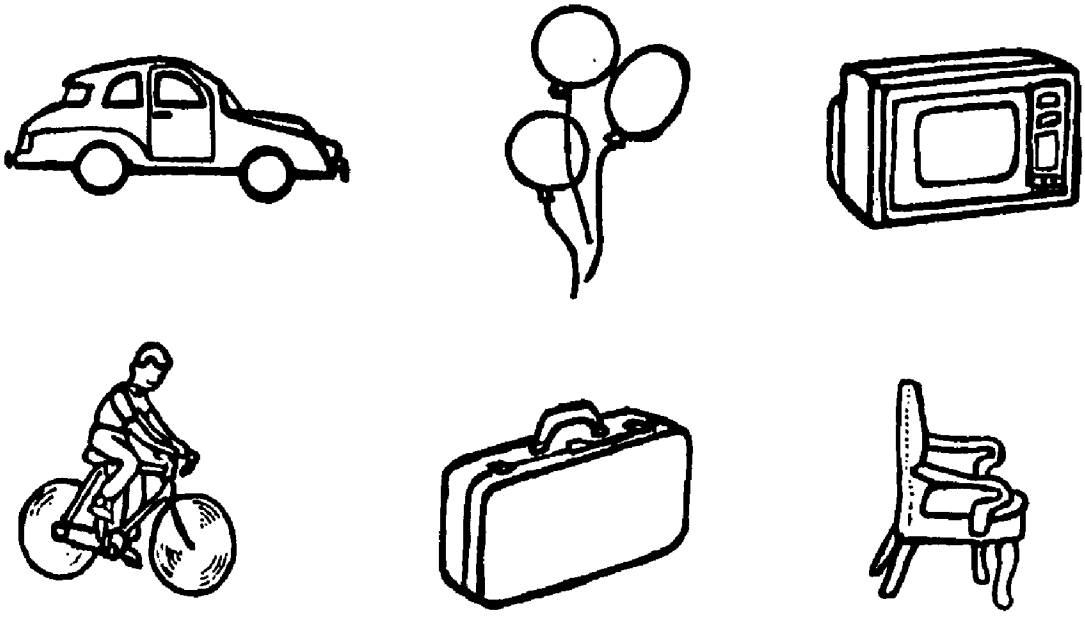
2. THE BEST THING TO HELP A PUPPY GROW



3. SOMETHING THAT IS NEEDED FOR GOOD HEALTH



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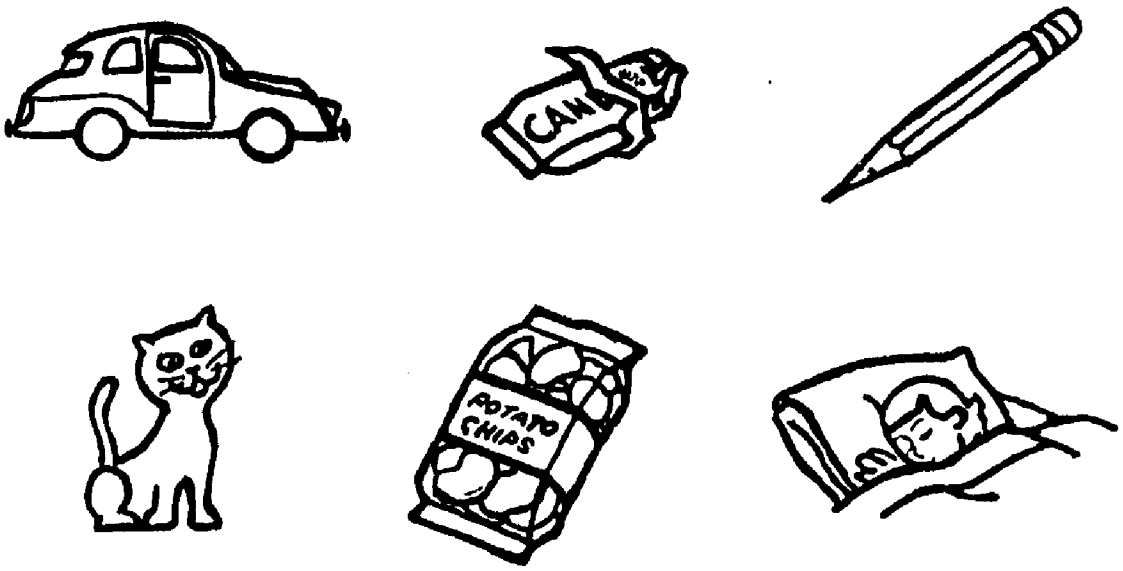
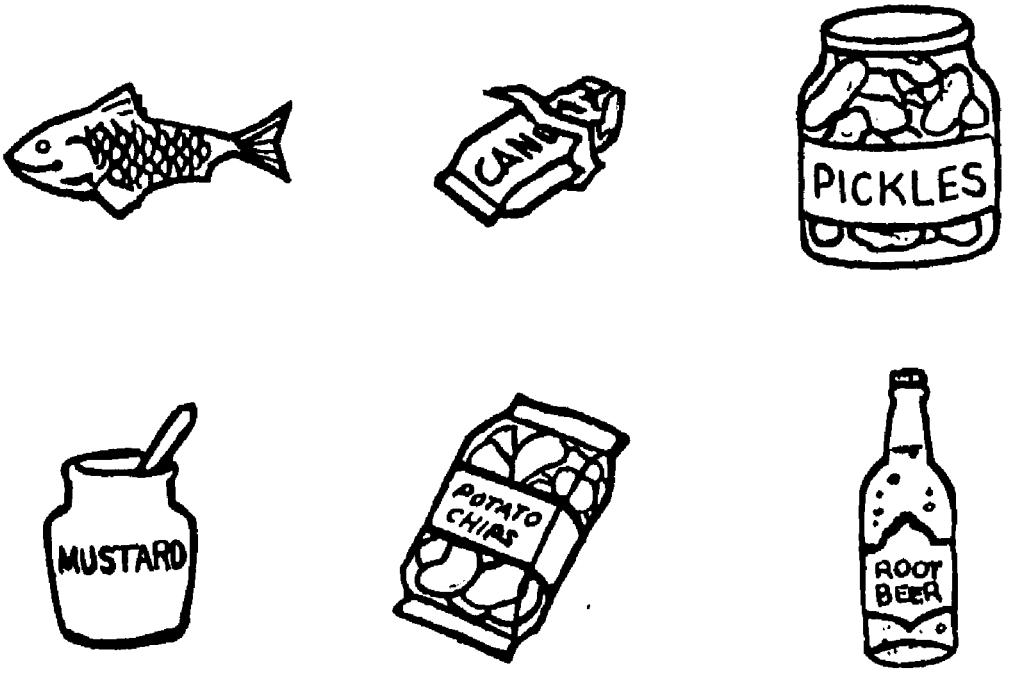
4. THE ONE THAT MAKES A PERSON HEALTHY



5. THE BEST FOOD TO CONTRIBUTE TO GOOD HEALTH



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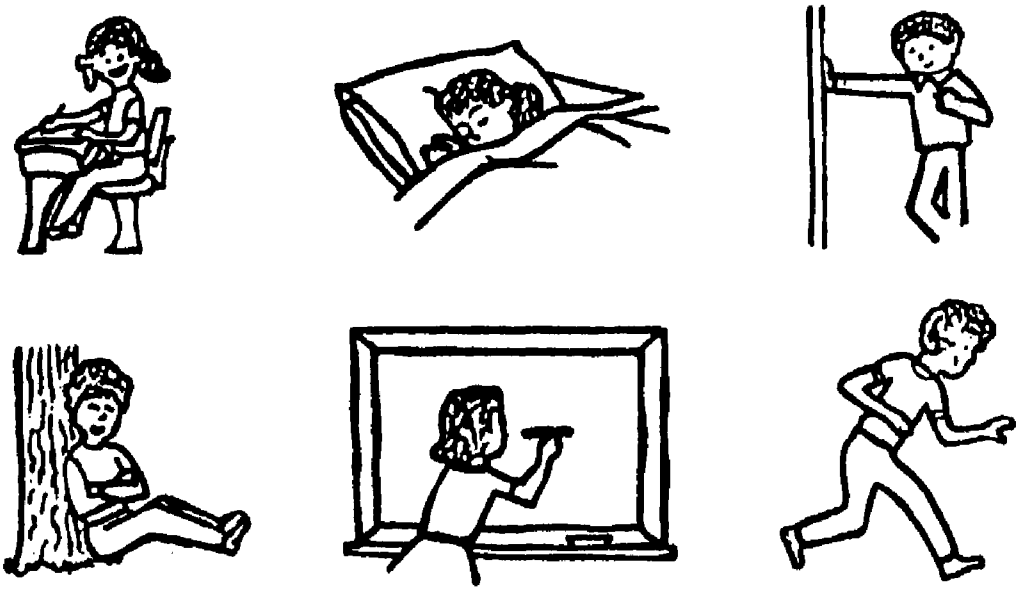
6. HOW YOU MIGHT LOOK IF YOU FEEL HUNGRY

7. THE PERSON WHO IS USING THE MOST ENERGY



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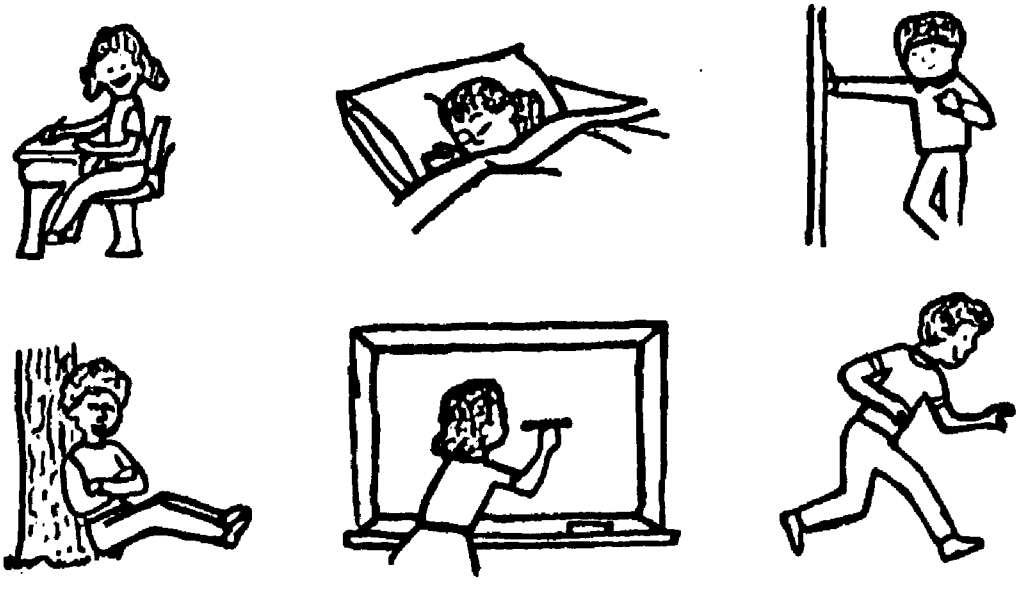
8. THE PERSON WHO IS USING THE SMALLEST AMOUNT OF ENERGY



9. THE FOOD THAT IS BEST FOR YOUR TEETH

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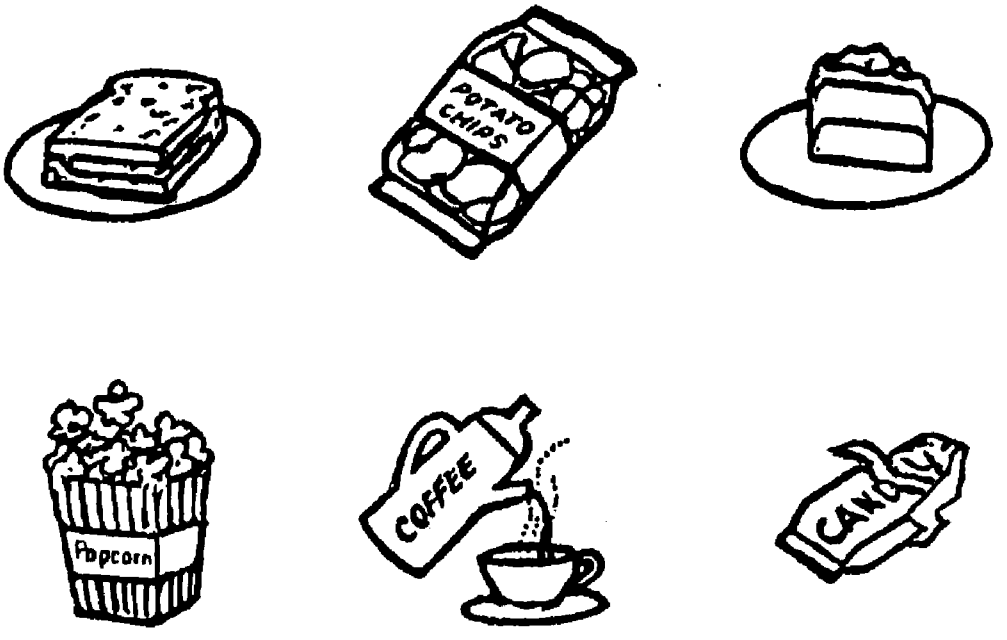
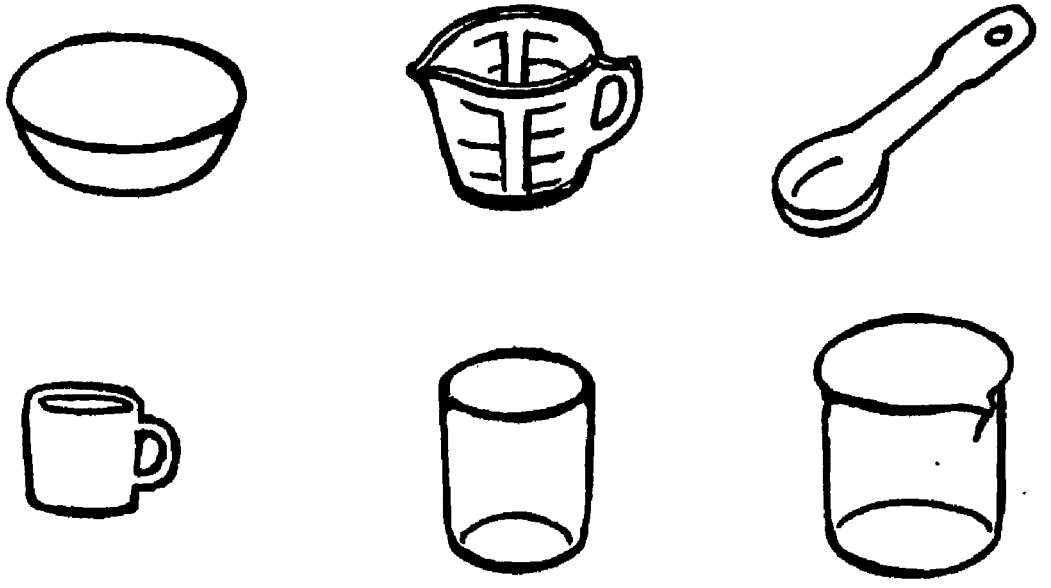
10. THE MOST HEALTHY FOOD FOR LUNCH



11. THE ONE YOU SHOULD USE TO MEASURE A CUP OF MILK



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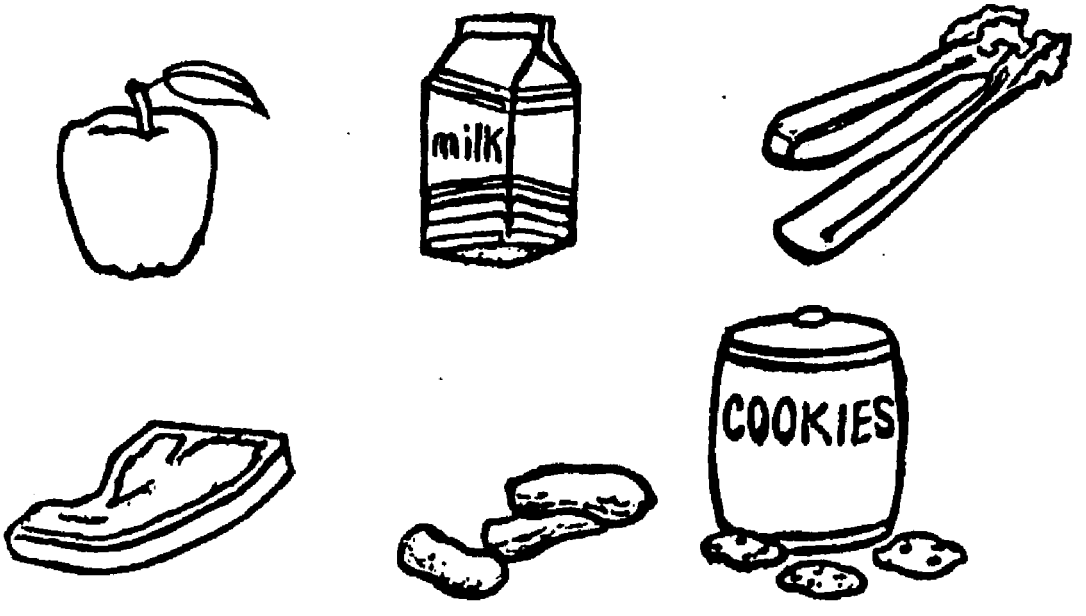
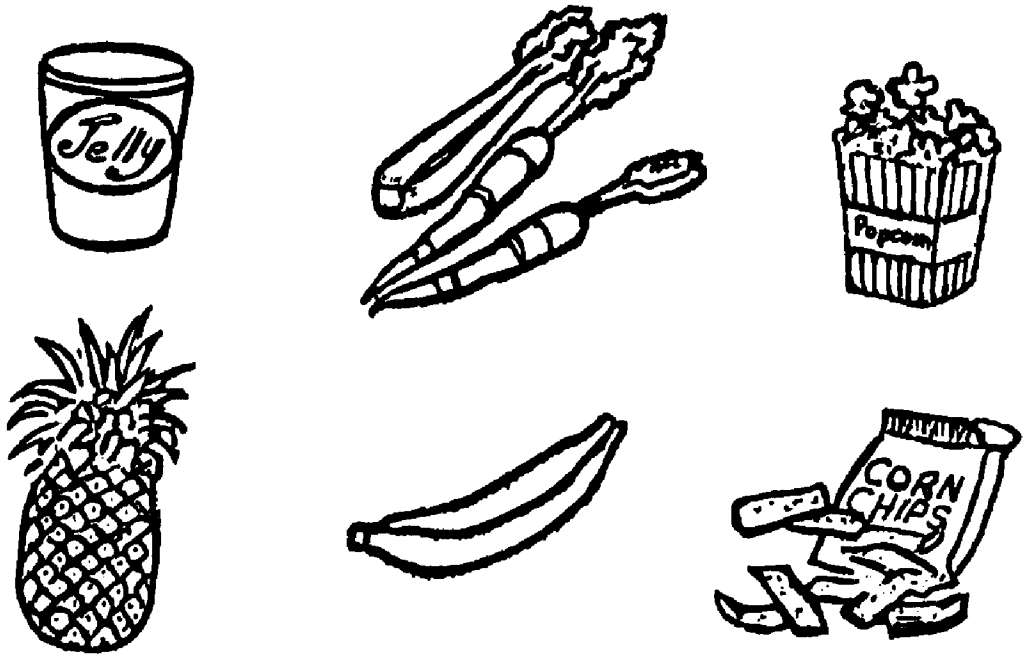
12. THE ONE THAT IS MADE BY MIXING SEVERAL THINGS TOGETHER



13. FOOD THAT IS OFTEN USED TO MAKE SOUP



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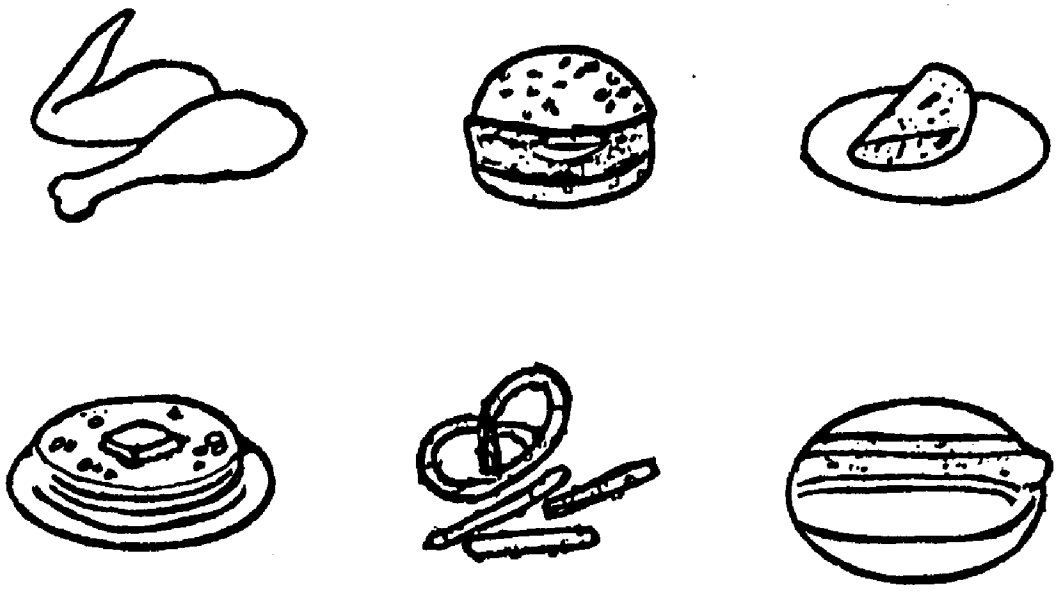
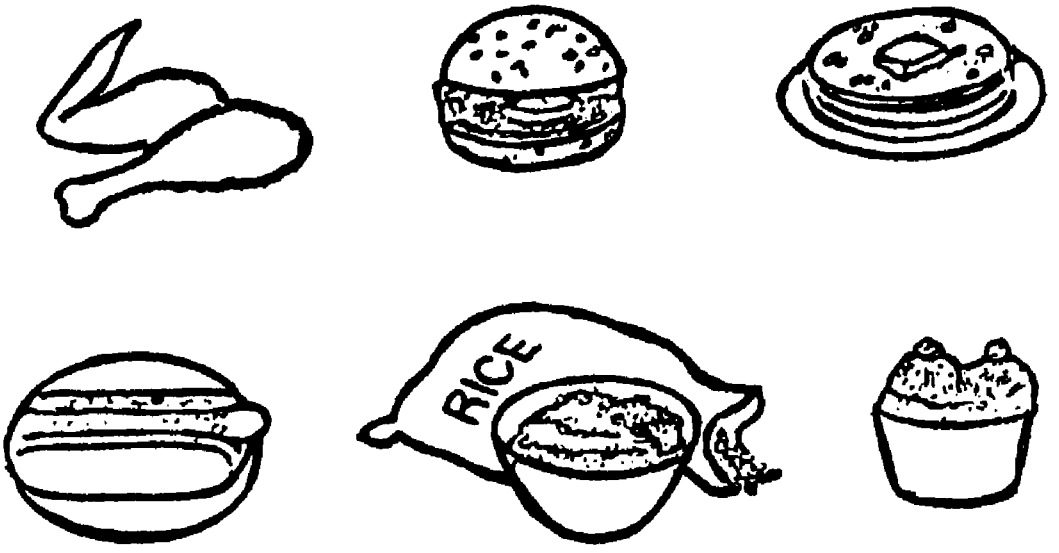
14. A MEXICAN FOOD



15. A VERY IMPORTANT FOOD FOR CHINESE PEOPLE



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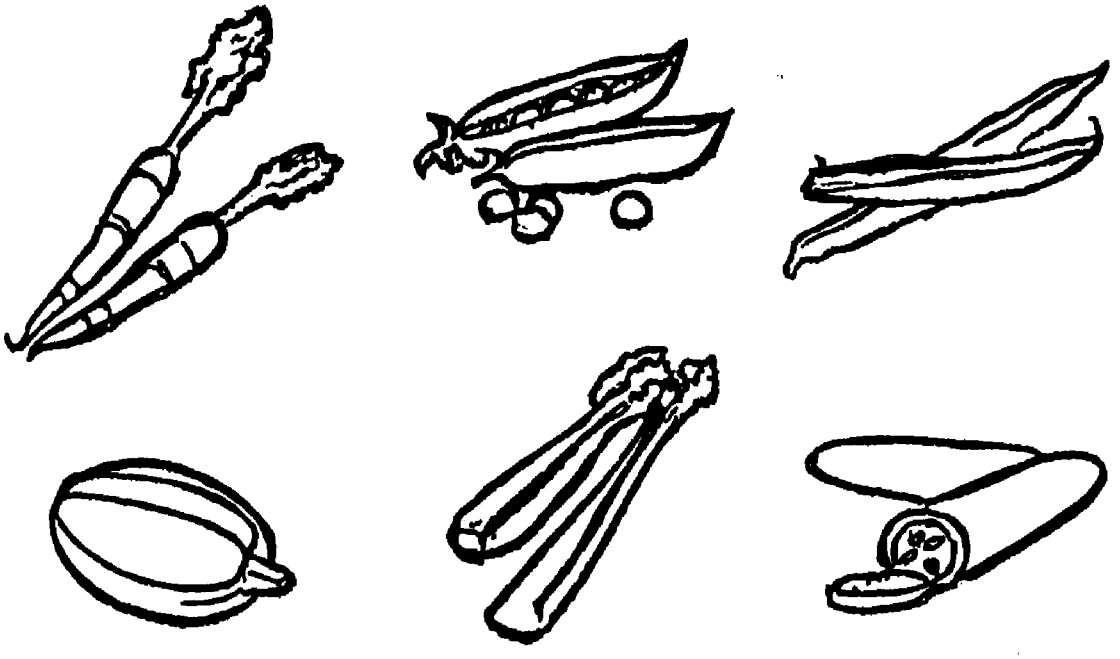
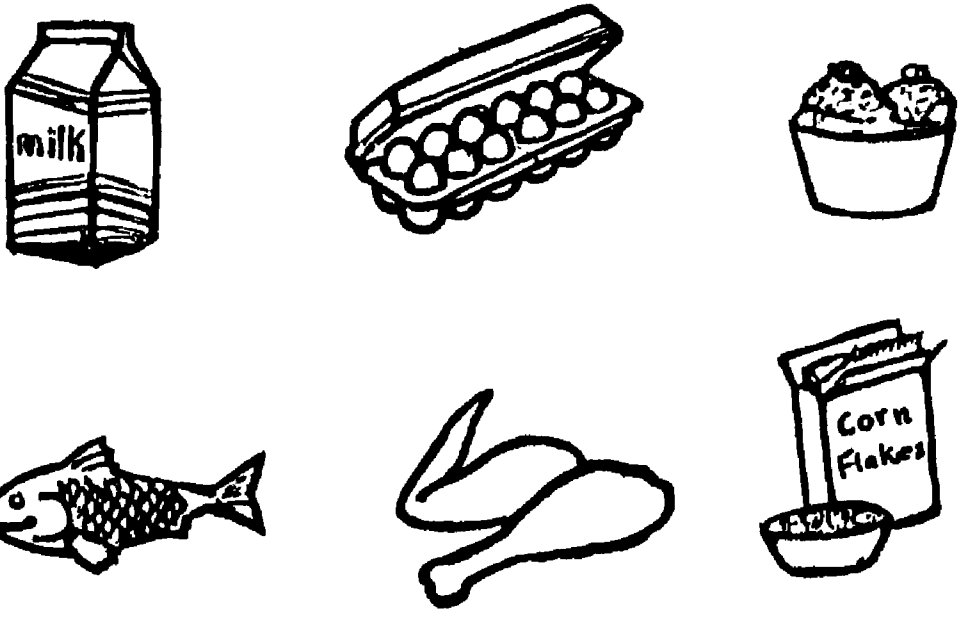
16. THE VEGETABLE THAT GROWS UNDERGROUND



17. A FOOD THAT COMES FROM A PLANT



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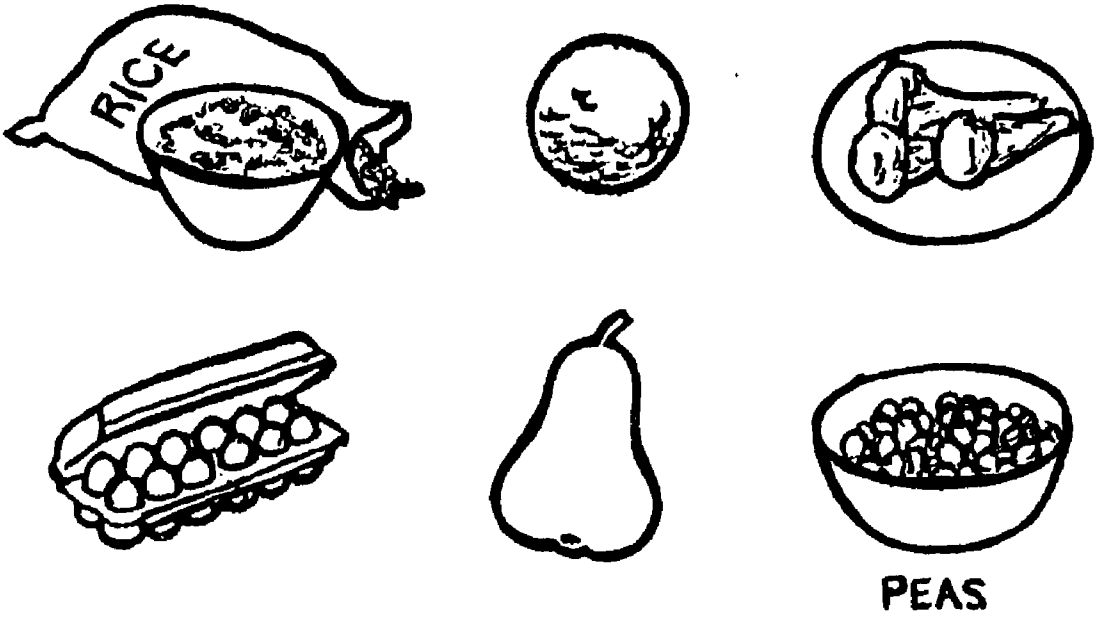
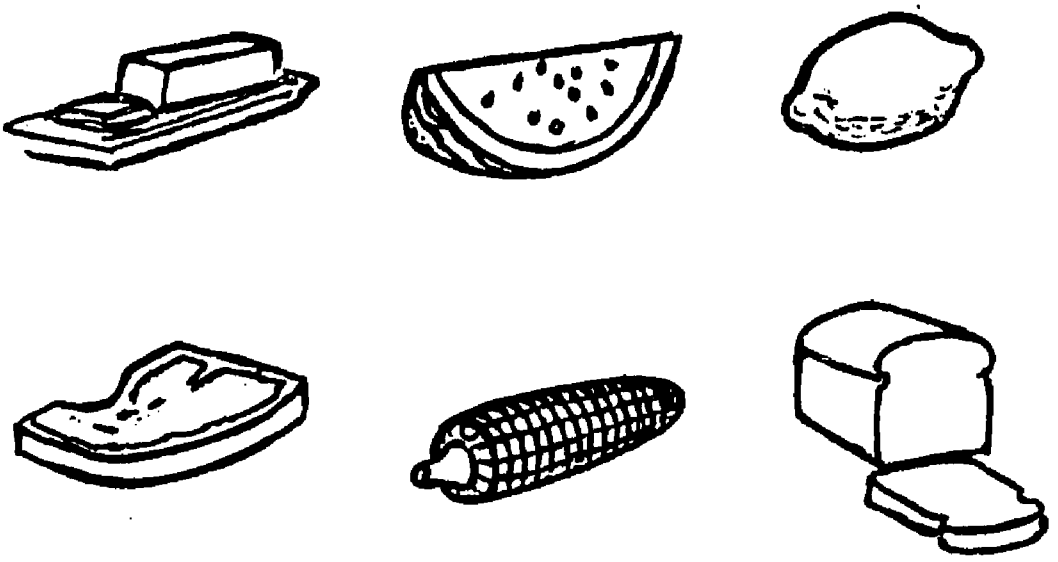
18. A FOOD THAT COMES FROM AN ANIMAL



19. A FOOD THAT IS OFTEN CANNED



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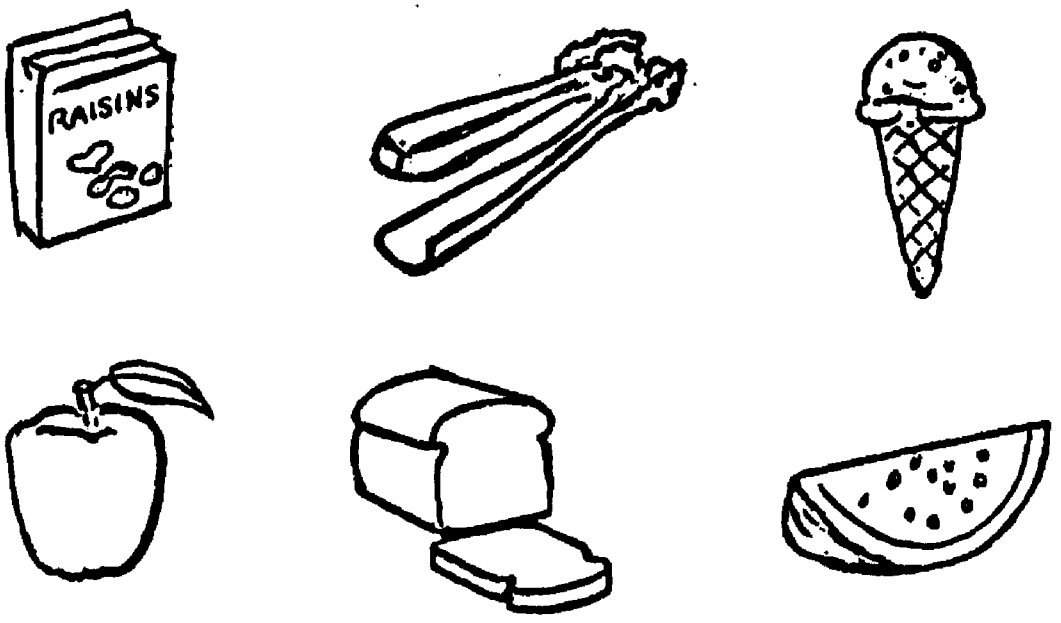
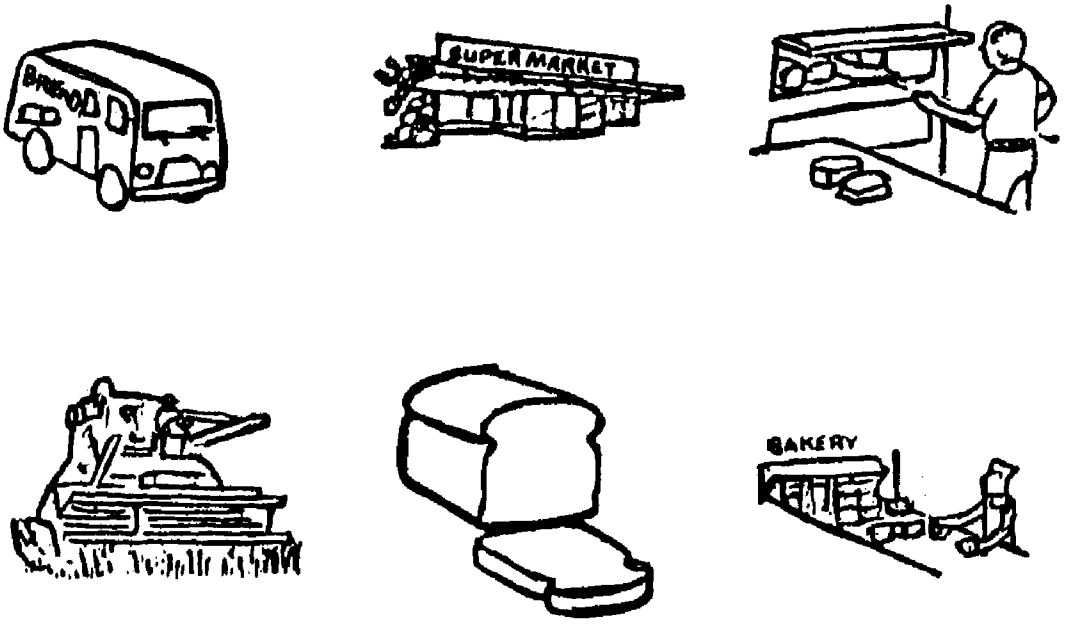
20. THE FOOD THAT HAS BEEN DRIED



21. THE FIRST STEP IN PRODUCING A LOAF OF BREAD



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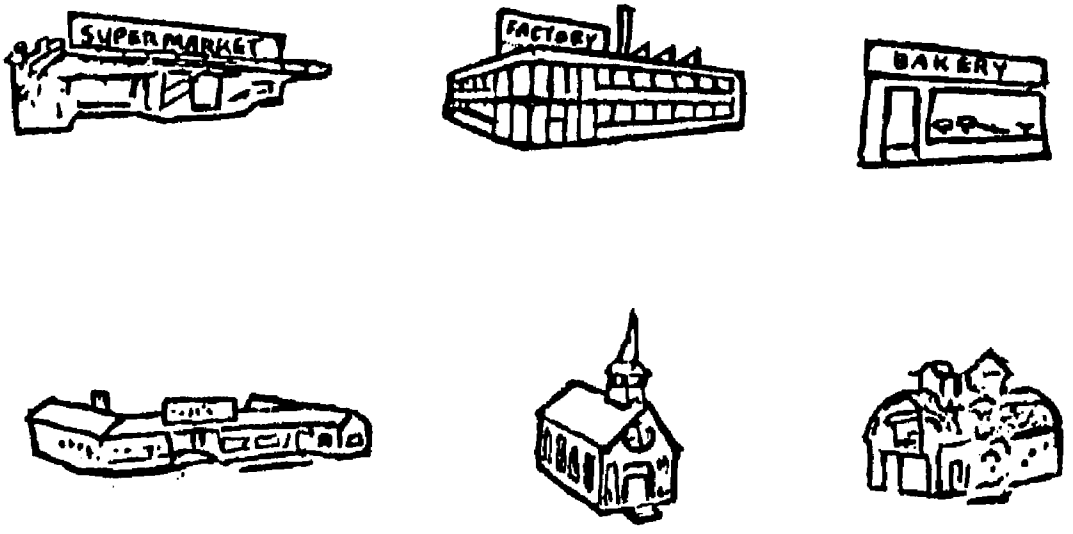
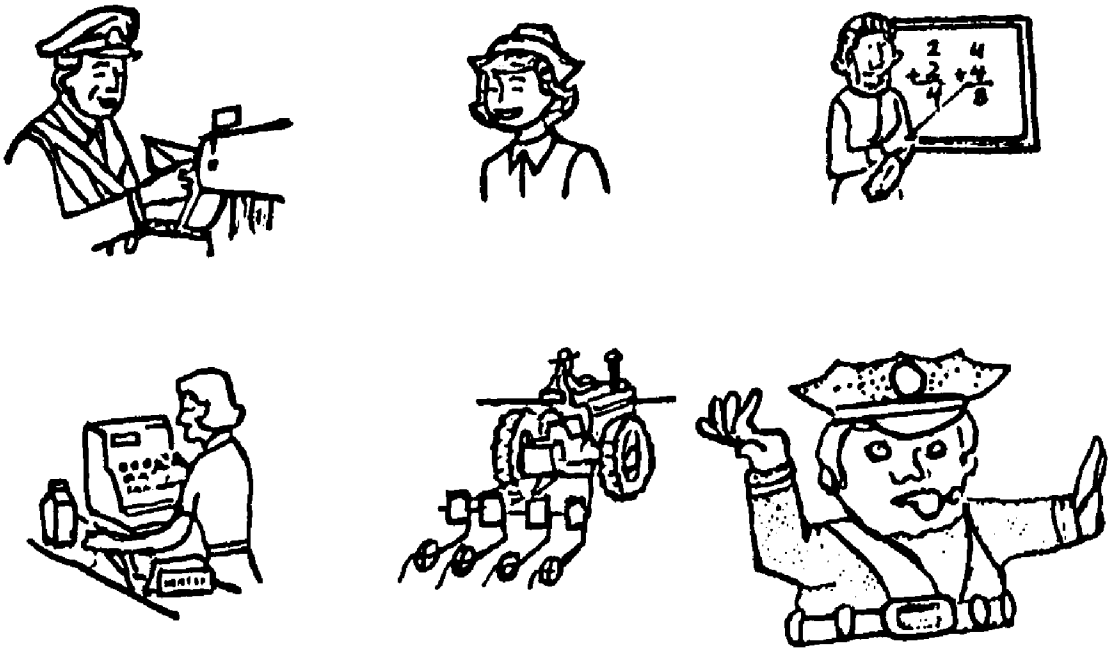
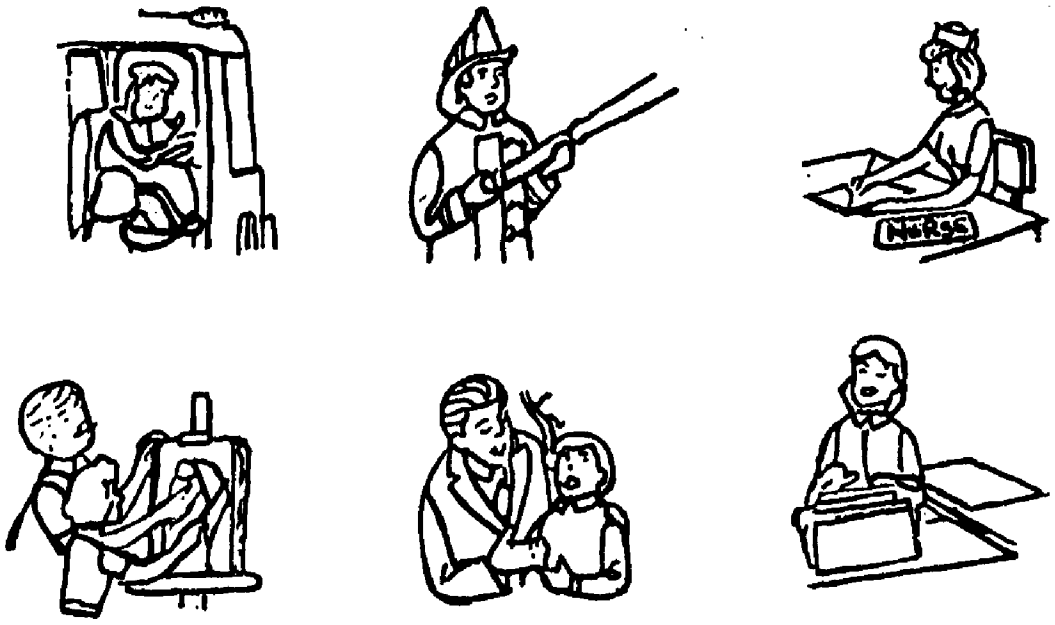
22. THE PLACE WHERE FOODS ARE CANNED



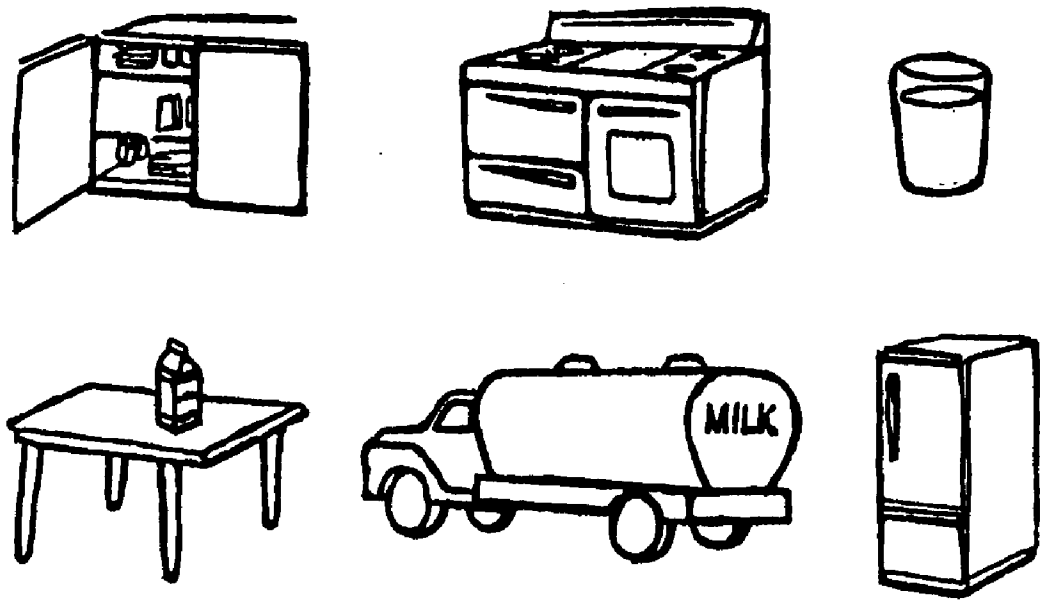
23. THE PERSON WHO HELPS PRODUCE OUR FOOD



24. A GOOD SOURCE OF NUTRITION INFORMATION



25. THE BEST PLACE FOR MILK TO BE STORED IN YOUR HOME



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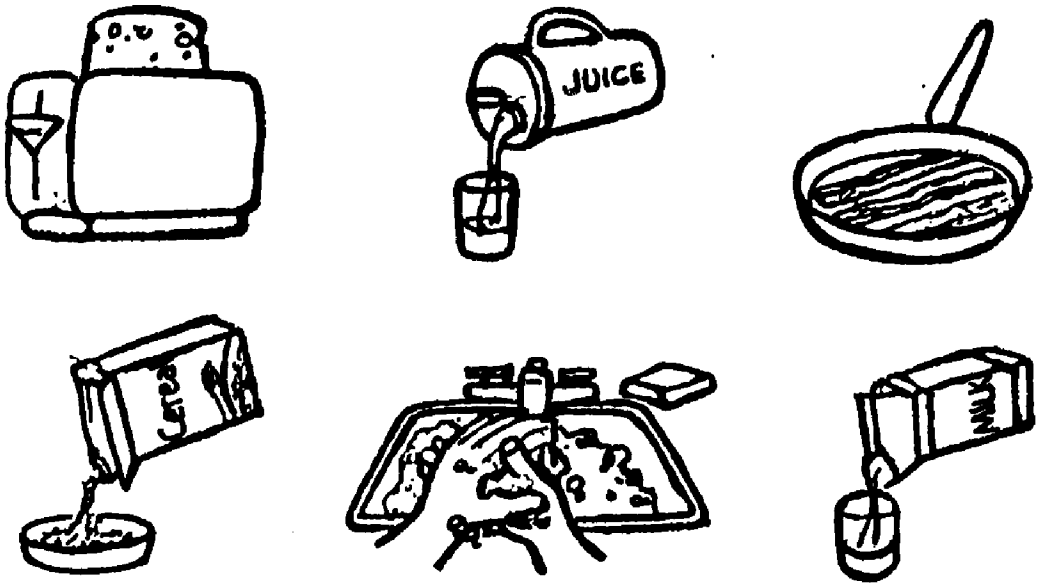
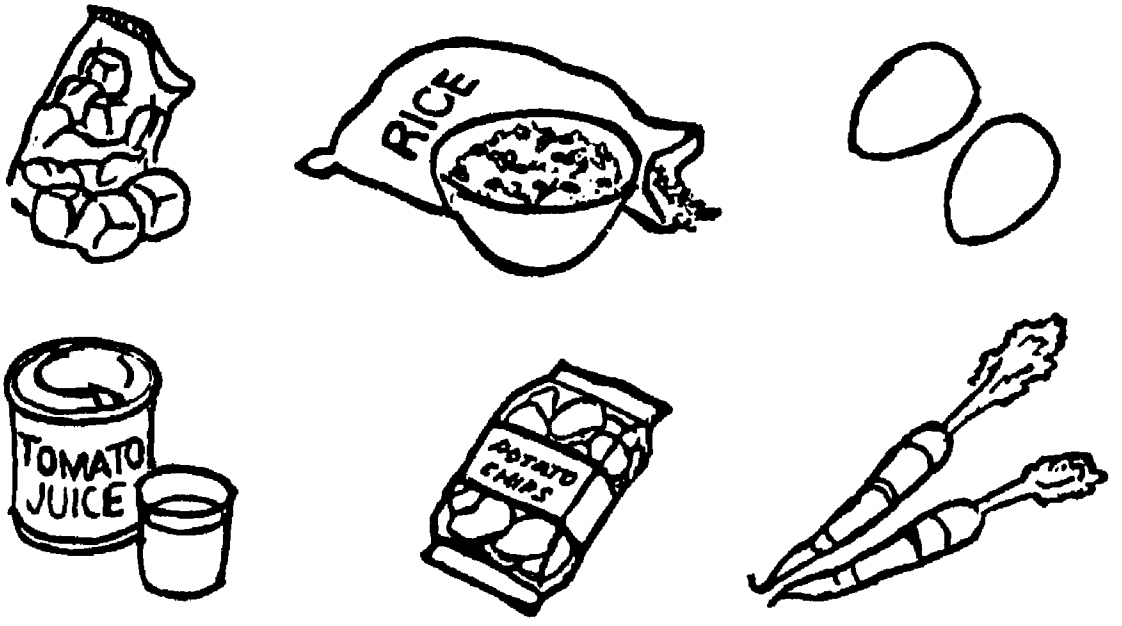
26. WHAT SHOULD YOU DO FIRST BEFORE PREPARING BREAKFAST?



27. A NECESSARY INGREDIENT IN MAKING PANCAKES



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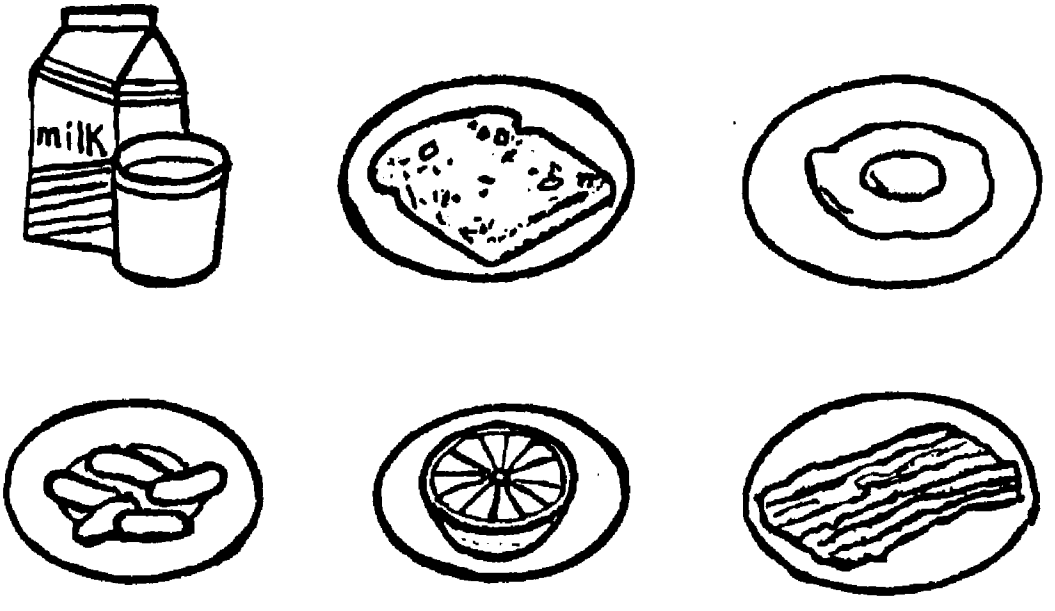
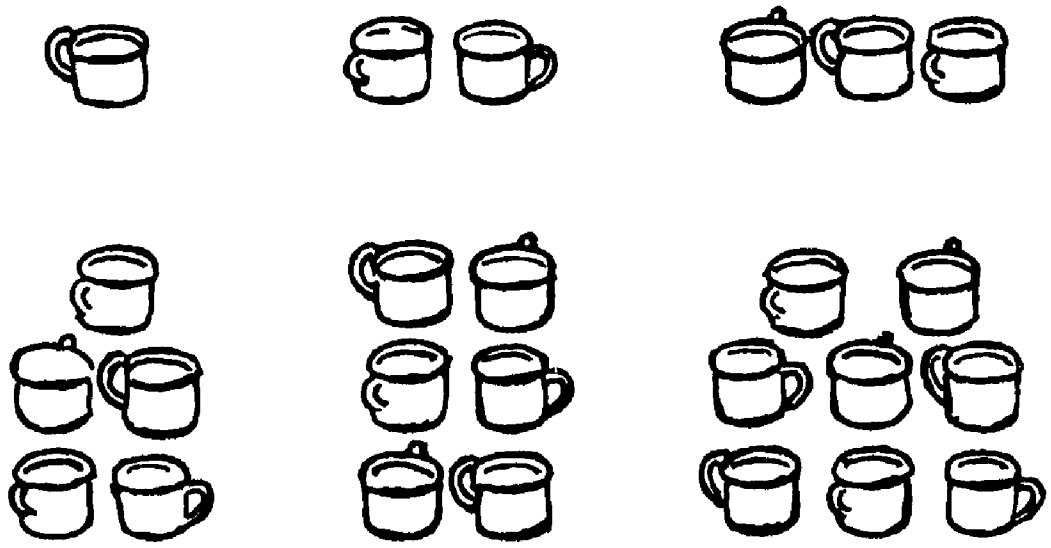
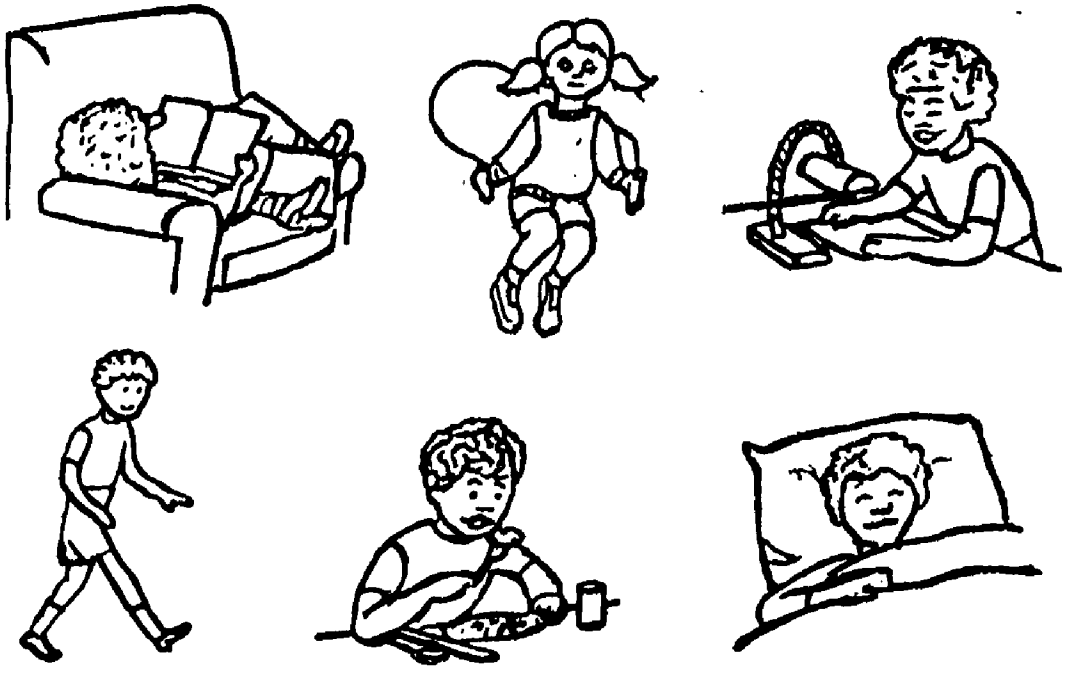
28. THE FOOD THAT IS IN THE SAME FOOD GROUP AS PANCAKES



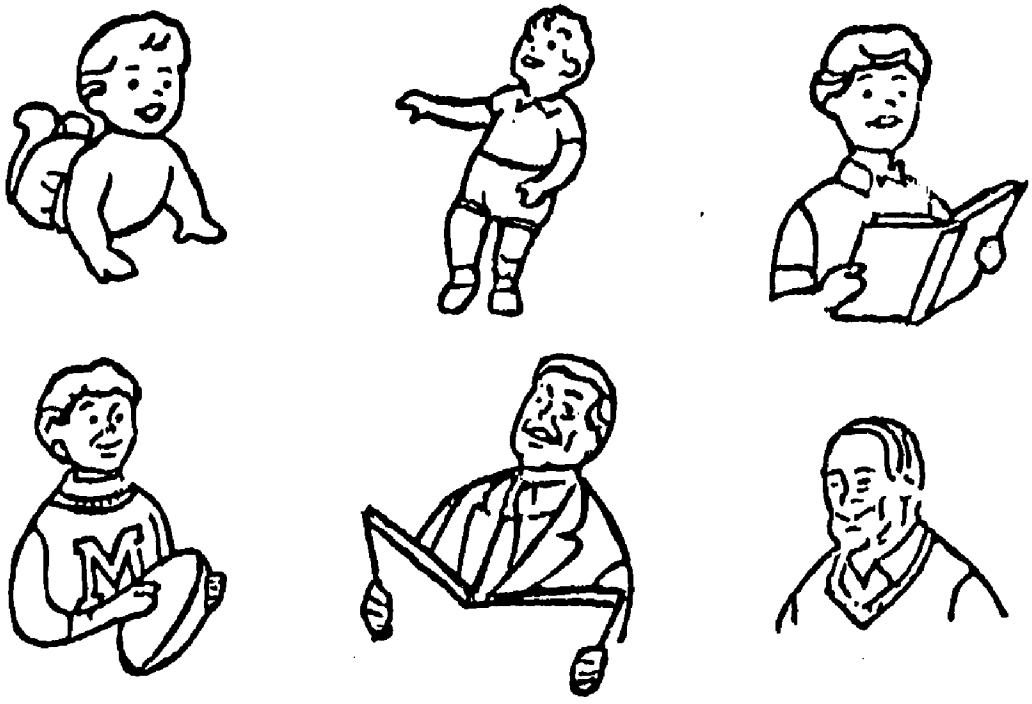
29. THE NUMBER OF CUPS OF MILK RECOMMENDED FOR YOU EACH DAY



30. THE ACTIVITY THAT REQUIRES YOU TO EAT THE MOST



31. THE PERSON WHO NEEDS THE LEAST AMOUNT OF FOOD EACH DAY



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32. THE PERSON WHO NEEDS THE MOST FOOD EACH DAY

33. THE ONE WHO MOST OFTEN HELPS YOU DECIDE WHAT FOODS TO EAT

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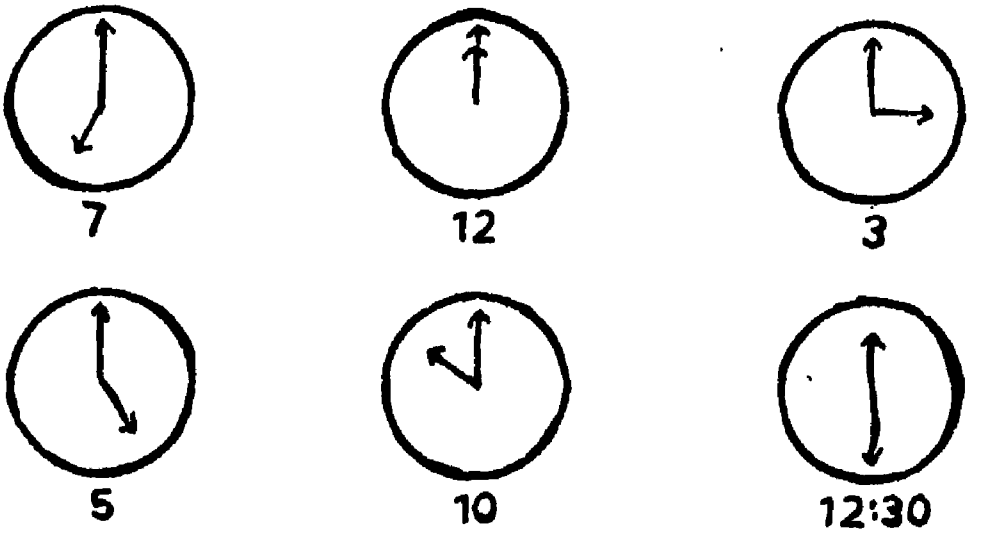
34. THE CLOCK THAT SHOWS A TIME ON A SCHOOL DAY WHEN CHILDREN MIGHT EAT BREAKFAST



35. THE FOOD THAT HAS THE MOST SUGAR

APPENDIX G

NUTRITION ACHIEVEMENT TEST 2

NUTRITION ACHIEVEMENT

Test 2

DIRECTIONS: Your teacher will read the test questions to the class. Circle the best answer.

1. How many servings of the bread group should we have each day?

   A. 1
   B. 2
   C. 3
   D. 4

2. Which is a food from the meat group?

   A. milk
   B. lettuce
   C. peanut butter
   D. tomato

3. Which nutrient is found mostly in the meat group?

   A. protein
   B. carbohydrate
   C. fat
   D. water

4. What do carbohydrates give us?

   A. muscles
   B. strong teeth
   C. money
   D. energy

5. Which part of the plant do carrots come from?

   A. leaf
   B. root
   C. stem
   D. top

6. Which activity uses up the most energy?

   A. running
   B. reading
   C. sleeping
   D. sitting

7. Which nutrient helps your muscles grow?

   A. water
   B. carbohydrates
   C. protein
   D. fat

8. Which food would help to build strong bones and teeth?

   A. milk
   B. bread
   C. hot dog
   D. banana

9. Which is a food in the bread group?

   A. coke
   B. pudding
   C. milk
   D. rice

10. How many servings from the fruit and vegetable group should we eat every day?

   A. 1
   B. 2
   C. 3
   D. 4

11. Which food comes from the milk group?

   A. ham
   B. grapes
   C. cheese
   D. lemonade

12. Which food comes from the vegetable and fruit group?

   A. peach
   B. ice cream
   C. jelly beans
   D. spaghetti

13. Which food group should we eat 2 servings from each day?

   A. milk
   B. meat
   C. bread
   D. fruit and vegetable

14. Which food group do crackers come from?

A. milk
B. meat
C. bread
D. fruit and vegetable

15. Which food group are carrots in?

A. milk
B. meat
C. bread
D. fruit and vegetable

16. What food group should we eat 3 servings from each day?

A. meat
B. milk
C. fruit and vegetables
D. bread

17. Carlos has been running and is thirsty. Why is water important for his body right now?

A. Water helps regulate body temperature.
B. Water relieves tiredness.
C. Water provides energy.
D. Water supports growth.

18. Which food gives the most Vitamin C?

A. sweet potato
B. tomato
C. lettuce
D. corn

19. Which food gives the most protein?

A. egg
B. bread
C. spinach
D. orange

20. Which food gives the most calcium?

A. celery
B. roast beef
C. peas
D. milk

21. Which food has the most fat?

    A. banana
    B. bread
    C. butter
    D. orange

22. Which food gives calories but not very many vitamins and minerals?

    A. candy
    B. chicken
    C. white potato
    D. fresh strawberries

23. Which is the most nutritious breakfast?

    A. orange juice
    B. bacon, milk
    C. banana and cream, sweet roll
    D. fried egg sandwich, fresh peach, milk

24. Which is the most nutritious snack to eat in the middle of the morning?

    A. candy bar
    B. banana
    C. frosted jelly roll
    D. cookies

25. Which is the most nutritious lunch?

    A. waffle, syrup, milk
    B. tuna sandwich, limeade
    C. taco, milk, orange
    D. jelly sandwich, potato chips, soda pop

26. Which sack lunch has one food from each of the food groups?

    A. chicken salad sandwich, banana, milk
    B. jelly sandwich, oatmeal cookies, milk
    C. peanut butter sandwich, potato chips, soda pop
    D. meat loaf sandwich, chocolate pudding, iced tea

27. Which food groups does a plain balogna sandwich belong to?

A. milk, grain
B. meat, grain
C. milk, meat, grain
D. meat, fruit-vegetable

28. Which food has the most water in it?

A. bread
B. raisins
C. orange
D. popcorn

29. What could be added to the following meal so that is includes a food from each food groups?

Breakfast

Orange Juice	Toast
Milk	Butter

A. two pancakes with butter
B. scrambled eggs
C. cereal with milk
D. sliced peaches

30. Jane is the same height and weight as Mary but Jane exercises more than Mary. What does Jane need?

A. less food than Mary
B. the same amount of food as Mary
C. more food and water than Mary
D. more food but less water than Mary

APPENDIX H

MENUS

MENUS FOR FOOD CONSUMPTION STUDY

Traditional Method

Monday - April 11

Ham and Cheese on Bun - 1 oz. ham, 1 oz. cheese, 2 oz. bun

Buttered Corn - #16 scoop

Salad Cup (Lettuce, Tomato, Pickle) - #16 scoop

Yellow Cake with Pineapple Frosting - 80 servings per pan (18" X 25")

Milk - 8 oz.

Fruit Cocktail - #16 scoop

Wednesday - April 13

Tacos - 1 1/2 oz. meat, 1/2 oz. cheese (one per serving)

Baked Beans - #16 scoop

Salad Cup - #16 Scoop

Pear Halves - #16 scoop or 1 pear half

Cinnamon Roll - 2 oz.

Milk - 8 oz.

Friday - April 15

Tuna Salad - #16 scoop

Bun - 1 oz.

Lettuce and Tomato - #16 scoop

French Fries - #16 scoop

Oatmeal Cookie - #40 scoop to measure dough

Apricots - #16 scoop

Milk - 8 oz.

MENUS FOR FOOD CONSUMPTION STUDY

"Offer Versus Serve"

Monday - April 18

Ham and Cheese on Bun - 1 oz. ham, 1 oz. cheese, 2 oz. bun

Buttered Corn - #16 scoop

Salad Cup (Lettuce, Tomato, Pickle) - #16 scoop

Yellow Cake with Pineapple Frosting - 80 servings per pan (18" X 25")

Milk - 8 oz.

Fruit Cocktail - #16 scoop

Wednesday - April 20

Tacos - 1 1/2 oz. meat, 1/2 oz. cheese (one per serving)

Baked Beans - #16 scoop

Salad Cup - #16 scoop

Pear Halves - #16 scoop or 1 pear half

Cinnamon Roll - 2 oz.

Milk - 8 oz.

Friday - April 22

Tuna Salad - #16 scoop

Bun - 1 oz.

Lettuce and Tomato - #16 scoop

French Fries - #16 scoop

Oatmeal Cookie - #40 scoop to measure dough

Apricots - #16 scoop

Milk - 8 oz.

APPENDIX I

FOOD CONSUMPTION RATING INSTRUMENT

FOOD CONSUMPTION RATING SCALE

Menu Item	Ate None	Tasted	Ate About 1/3	Ate About 1/2	Ate About 2/3	Ate Almost All	Ate All
Meat							
Comb. Dish							
Vegetable							
Fruit							
Salad							
Bread							
Dessert							
Milk							

Rater_____ Tray No._____

APPENDIX J

LIST OF FOOD CONSUMPTION RATERS

Food Consumption Raters

Dr. Margaret Jolley - Nutritionist and retired Dean of the College of Life Sciences, Nicholls State University

Mrs. Rea Gilbert - Home Economist retired from the Louisiana Cooperative Extension Service

Mrs. Ruby Forrest - Retired Home Economics Teacher

Mrs. Ceil Toups - Retired Public School Teacher

Mrs. Beulah Weimer - Home Economist and Active Homemaker

VITA

Faye Blanchard Robichaux was born in Napoleonville, Louisiana on January 8, 1943, the daughter of Mr. and Mrs. Wilbur Blanchard. She graduated from the University of Southwestern Louisiana in 1965 with a Bachelor of Science degree in Home Economics (Dietetics). In 1977, she received her Masters of Business Administration degree from Nicholls State University with emphasis in finance and management. She became a registered dietitian in 1978. She received her Doctor of Education degree with a minor in nutrition in August of 1983 from Louisiana State University.

She has worked as an assistant dietitian, as a dietary department head in a hospital, as a consulting dietitian in a nursing home and in a home for mentally retarded adults, and as an assistant professor at Nicholls State University, where she is presently employed. She is a member of the American Home Economics Association, the Louisiana Home Economics Association, the American Dietetic Association, the Louisiana Dietetic Association, as well as their local affiliate organizations. She is also a member of Kappa Omicron Phi.

EXAMINATION AND THESIS REPORT

Candidate: Faye B. Robichaux

Major Field: Education

Title of Thesis: School Lunch Consumption in Terms of Serving Method

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

July 14, 1983